Nomination for inscription on
The UNESCO World Heritage List

CULTURAL LANDSCAPE OF BALI PROVINCE

The Ministry of Culture and Tourism of the Republic of Indonesia
The Government of Bali Province
2011

CHAPTER TWO

DESCRIPTION

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the God of the Masceti temple, who controls the rats, must be given offerings
and the God of Sakenan Temple, who controls grasshoppers, should be given offerings
If there is a problem at the weir, perform the balik sumpah ritual at the Ulun Swi temple...

Dewa Tattwa (History of the Gods), a traditional Balinese lontar manuscript
Date: Icaka 1865
Author: Ida Pedanda Made

Mount and Lake Batur

Introduction: Subaks and Water Temples

The sites chosen for this nomination were selected to exemplify the Balinese *subak* system, and the water temples and landscape features with which it is associated. *Subak* is a Balinese word, which first appears in royal inscriptions in the eleventh century.[1] It refers to a unique social and religious institution; a self-governing, democratic organization of farmers who share responsibility for the

[1] The first appearance of the term "subak" is as the root of the word *kasuwakan* in the Pandak Bandung inscription of 1071 AD (No. 436). Sukarto K. Atmodjo, M. M. 1986. Some short notes on agricultural data from ancient Balinese inscriptions. In *Papers of the Fourth Indonesian-Dutch History Conference, Yogyakarta 24-29 July 1983, Vol. I: Agrarian History* (ed. Sartono Kartodirdjo). Yogyakarta: Gadjah Mada University Press, pp. 32-33.

just and efficient use of irrigation water to grow paddy rice. Subaks are not villages, rather they are specialized institutions charged with the management of irrigation water. Most subaks possess written legal codes, called *awig-awig*, which detail the rights and responsibilities of subak membership. Importantly, the subaks are not only practical managers of water; they also possess a religious dimension stemming from the belief that irrigation water is a gift from the Goddess of the Lake(s), Dewi Danu. Subaks are entrusted with the management of this gift, and farmers are expected to contribute a small portion of their harvest each year to religious rites in subak temples, which are dedicated to Dewi Danu and other deities associated with the fertility of the land. The boundaries of a *subak* are usually defined by the collection of paddy fields that are irrigated by a shared tertiary irrigation infrastructure. *Subak* territories vary from a few hectares in the uplands to several hundred hectares in the lower reaches of the largest rivers. Presently there are approximately 82,000 hectares of irrigated rice terraces in Bali.

The expansion of the subak system of wet rice cultivation over roughly the last thousand years transformed the Balinese landscape. Balinese volcanoes are part of the Sunda-Banda arc, a continuous geological structure that extends for approximately 4700 km from the northern tip of Sumatra in the west to the island of Nila in the east.[2] The formation of the Batur caldera circa 23,670± 210 y. B.P. deposited a mineral-rich ignimbrite layer over most of southern Bali, which became the Balinese "ricebowl", with irrigated rice terraces developing by the eighth century A.D.[3] The landscape is especially rugged on the southern slopes of Mount Batur, where early kingdoms flourished. According to Balinese mythology, the volcanic peaks are fragments of the cosmic mountain that were brought to the island by the Hindu gods. The flanks of the volcanoes are deeply incised by ravines containing small rivers and streams. At the bottom of the ravines, over the centuries the subaks have constructed hundreds of small diversionary weirs. The highest weirs are located near the maximum elevation

[2] Wheller, G.E., Varne, R., Foden, J.D., Abbot, M.J., 1987. Geochemistry of quaternary volcanism in the Sunda-Banda Arc, Indonesia, and three-component genesis of island-arc basaltic magmas. *J. Volcanol. Geotherm. Res. 32*, 137–160.

[3] Lansing, J. Stephen, Vanda Gerhart, James N. Kremer , Patricia Kremer, Alit Arthawiguna, Suprapto, Ida Bagus Suryawan, I Gusti Arsana, Vernon L.Scarborough and Kimberly Mikita. 2001. "Volcanic Fertilization of Balinese Rice Paddies", *Ecological Economics* 38 (2001):383-390.

where rice will grow. More weirs are situated downstream, spaced a few kilometers apart until they reach the coast. Each weir diverts the flow from a short stretch of river into a small irrigation tunnel, usually no taller than a man and about a meter in width. The tunnels angle sidewise and emerge a kilometer or more downslope to flood rice terraces that have been carved into the flanks of the volcanoes. Each subak manages one or more blocks of terraces. When the water supply exceeds the amount needed for the first subak, canals and tunnels are often extended to transport the excess flow to more distant subaks downstream. In this way, using traditional engineering techniques the subaks are able to deliver small quantities of water with astonishing accuracy to terraces located as much as several kilometers from a water source. With this ancient technology, over the centuries rice cultivation spread over much of the island, as small teams of skilled workers drew the water out in long spidery threads that crisscrossed the slopes of the sacred mountains.

Mount and Lake Batur, 1920

Because the right of each subak to use irrigation water is based on the performance of annual cycles of rituals honoring the Goddess of the Lake and other deities, the cultural landscape created by the subaks includes water temples and shrines as well as the engineered landscape of dams, tunnels, aqueducts, and rice terraces. Each subak maintains a local network of shrines and water temples, where farmers make offerings to their gods. The schedule of ritual activities in these shrines and temples is keyed to the growth cycle of native Balinese rice, and the complex Balinese system of time reckoning finds one of its fullest expressions in these rites.[4]

As well as honoring the gods, the interlocking cycles of water temple rites also provide a template for the management of ecological processes in the paddy fields. By adjusting the flow of irrigation water, farmers can exert control over many ecological processes in their fields. Mineral nutrients needed by the rice are leached from the volcanic landscape by the monsoon rains, and transported to the fields in the irrigation water. Water can also be used to manage rice pests (rodents, insects and diseases) by synchronizing fallow periods in large contiguous blocks of rice terraces. After harvest, the fields are flooded, depriving pests of their habitat and thus causing their numbers to dwindle. The success of this method of pest control depends on the ability of the farmers to schedule simultaneous harvests over large areas, so that the pests cannot migrate to a new food source. This requires a smoothly functioning, cooperative system of water management, physically embodied in

Control of rice pests by flooding the paddies at Batukaru

[4] Vernon L. Scarborough, John W. Schoenfelder and J. Stephen Lansing. 2000. “Early Statecraft on Bali: The Water Temple Complex and the Decentralization of the Political Economy”. *Research in Economic Anthropology*, Vol. 20: 299-330.

proportional irrigation dividers, which make it possible to tell at a glance how much water is flowing into each canal, and so verify that the division is in accordance with the agreed-upon schedule.[5]

The effective management of water often requires groups of subaks to coordinate their irrigation and planting schedules. These multi-subak groupings form the congregations of regional water temples. Such temples are larger and more imposing than ordinary subak temples. They exist to acknowledge the sites where water originates, such as crater lakes and springs. All of the farmers who benefit from a particular flow of water share an obligation to provide offerings at the temple where their water originates. For example, if six subaks obtain water from a given source, all six belong to the congregation of the water temple associated with that source. Thus the larger the water source, the larger the congregation of the water temple. The largest congregation, which presently includes more than 250 subaks, supports the supreme water temple, Pura Ulun Danu Batur, which is located on the rim of the volcanic crater overlooking Lake Batur. This temple receives annual offerings from its entire subak congregation, and its priests are often consulted by the subaks on questions about water rights and the development of new irrigation systems.

The Subak Landscape Defined

From a comparative perspective, two features of the subak system stand out. The first is the success of this cultural innovation in creating a landscape of spectacular beauty that has provided an ecologically sustainable foundation for Balinese civilization for the past millennium. This achievement is rooted in the second remarkable feature of the subaks: their success as a system of cooperative resource management sustained by self-governing democratic institutions (the subaks). Like all traditional civilizations, in the premodern era Bali was ruled by princes and kings. Elsewhere in Asia, the power of princes was often associated with control of irrigation. But in Bali, water is regarded as the gift of a Goddess, and over the centuries Bali's rulers cooperated with the subaks to promote harmony with the natural and spiritual realms, in keeping with the philosophy of Tri Hita Karana. The rituals of the subak temples define specific complementary roles for farmers, princes and priests in sustaining the

[5] Lansing, J. Stephen and John H. Miller. 2005. Cooperation Games and Ecological Feedback: Some Insights from Bali. *Current Anthropology* 46(2): 328-334.

productivity of the landscape. Importantly, the components of the landscape cared for by the subaks extend beyond the rice terraces. They also include the lakes, springs and rivers that provide irrigation water; the weirs, tunnels, canals, aqueducts and rice terraces built and managed by the subaks; and the nested hierarchies of water temples that both honor the gods and provide an institutional framework for the management of irrigation and cropping cycles. All of these landscape features are referenced in the traditional legal mandate of the subaks, defined in *awig-awig* lawbooks.[6] In addition, the subaks are also ritually connected to two other important landscape features. The first consists of the forested areas that provide the rainfall catchments that feed the irrigation systems. The second consists of the village communities. Farmers are also villagers, and the life of the subak is deeply entwined with the life of the community. Traditional houses possess wooden rice barns, called *lumbung*, where rituals are held to honor the Rice Goddess, Dewi Sri, and other deities associated with the fertility of the countryside.

Within the landscape of subaks and terraced rice fields, the lives of the famers are organized around perennial rituals that are carried out in the water temples and in pilgrimages to the mountains and the sea. Looking at the system from the bottom up, each farmer has a small shrine *(bedugul)* located at the spot where irrigation water first enters his fields. This "upstream" corner of his fields is considered sacred; it is here that he makes offerings to the Rice Goddess incarnate in his crop. At harvest time, the rice which grows closest to the water inlet is traditionally used to create a sacred image of the Rice Goddess herself, which is not eaten, but carried to the rice barn and given offerings. (While these rites are not always practiced today in all regions of Bali, they are faithfully performed within the sites selected for this nomination).

Upstream from the farmer's field shrine, the next water temple is usually the subak temple, representing a block of irrigated terraces with a common water source. Several subaks make up the congregation of an Ulun Swi temple, associated with a large canal, and a weir- or spring-shrine. Several weirs typically form the congregation of a regional water temple (often called *Masceti*). Finally, each spring, lake and the headwaters of each river have shrines or temples. The largest water temple is furthest upstream: the Temple of the Crater

[6] Adatrechtsbundels XXXVII: Bali en Lombok. ‘s-Gravenhage: Nijhoff, 1934.

Lake, associated with Lake Batur which is considered to be the source of all irrigation waters within its river boundaries. There are also major water temples in the other crater lakes.

There are also several important water temples located further downslope, such as the royal water temple Pura Taman Ayun. Upstream and downstream temples have different functions, associated with two different symbolic properties of water. Upstream water is associated with the nourishing or life-giving effects of water, and is regarded as a gift from the Goddess of the Lake. In contrast, downstream water is cleansing water: water used to purify, to wash away pollution. It is not collected in sacred vessels, like upstream water, but left running in the rivers. Impurities such as the ashes from sacrifices are thrown directly into the rivers, which bear them to the sea. This is the basis of a powerful symbolic contrast: while the waters high above in the crater lake represent the mystery of water as life-giver, the waters of the sea are associated with the equally potent mysteries of dissolution and regeneration. By the time they reach the sea, the rivers are considered to be brimming with impurities- the ashes of burnt sacrifices, the discharge from village and fields. The sea dissolves them all, removing their human content as impurities, and returning them to a wild, elemental, natural state.

Thus the annual cycle of rituals performed by the farmers in the water temples has both spiritual meaning and important functional effects on the ecology of the rice paddies. Major rituals such as “Water Opening” enable dozens of subaks to coordinate their irrigation schedules at the watershed scale. This enables them to avoid the shortages of water that could ensue if too many subaks experienced peak irrigation demand at the same time. The scheduling of irrigation flows also enables the subaks to create fallow periods at appropriate scales, and in this way manage rice pests such as rats, insects, and bacterial and viral diseases. Regional fallow periods reduce the habitat for rice pests, at geographic scales that prevent large numbers of pests from migrating across the landscape. By providing a way for the farmers to achieve a balance between water sharing and pest control, the subaks and water temples exert effective control on the terraced landscape. The cycle of field rituals also promotes cooperation within and among subaks, and encourages participants to remember the key concepts of Tri Hita Karana.

Criteria for Selection: Overview

Pura Ulun Danu Batur

Today much of the Balinese rural landscape is still managed by subaks, but in recent years this landscape has become fragmented due to intense pressure from commercial development, and soil fertility has declined due to over-use of chemical fertilizers in many areas. There is a strong desire among the Balinese people to recognize and preserve the integrity of the traditional subak landscape while there is still time (a prominent topic of discussion in Bali's newspapers, television programs and seminars).

The sites chosen for the World Heritage nomination were carefully selected as the most appropriate to reflect the historic scope and continuing cultural role of Bali's subak system of ecological management. It is important to recognize that subaks are not simple water-user associations managed by single communities. Instead, subaks are connected via the water temple networks into functional hierarchies that manage the landscape at different scales, from whole watersheds to individual paddies. In this way, the subak system achieves an effective coordinated management of a large and complex ecosystem, which includes lakes, forests, rivers, springs and rice terraces. In keeping with the philosophy of Tri Hita Karana, the subaks and their water temples articulate a cosmological grid which attaches meaning to landscape features over entire watersheds. Further, they define specific responsibilities for the ongoing care and

preservation of particular landscape features by designated social groups. This system has evolved over approximately a millennium, and there are important differences in the ways it is manifest in different regions of Bali.

Based on these considerations, five sites were selected to represent particular aspects of the subak system; collectively they define its most important features. As will be explained below, two sites encompass entire functional hierarchies of water temples, subaks, forests and rivers. Three more sites were chosen to exemplify the key role of the crater lakes and forests, and higher-level water temples that include large congregations of subaks. All of these sites are still intact, having so far largely escaped commercial development. The last major criteria for inclusion was the historical importance of each component in the emergence of the subak system over the last millenium. Thus taken as a whole these sites represent the best exemplars of all major components of the subak system. To clarify the overall logic of the nomination, we begin with a brief overview of all five sites. This is followed by a detailed description of each site.

Proposed sites:

A. Supreme Water Temple Pura Ulun Danu and Lake Batur

District of Kintamani, Bangli Regency

This site includes two component parts, the temple and the lake.

B. Subak Landscape of Pakerisan Watershed

District of Pakerisan, Gianyar Regency

This site includes villages, springs, subak rice terraces, water temples, archaeological sites from early kingdoms and a section of the Pakerisan river:

1. Subaks Pulagan and Kulub (Upper and Lower) and their terraced fields and irrigation systems.
2. Villages of Kulub, Tampaksiring and Manukaya Let, homes of the farmers who form the congregations of these three subaks.
3. Water Temple Pura Pegulingan
4. Water Temple Pura Tirtha Empul

5. Water Temple Pura Mengening
6. Ancient archaeological sities of Gunung Kawi

C. Subak Landscape of Catur Angga Batukaru

District of Penebel, Tabanan Regency and District of Sukasada, Buleleng Regency

This site includes two mountain lakes, a large protected forest, 17 subaks and their rice terraces, villages, water temples, springs and sections of several rivers:

1. Subaks Bedugul, Jatiluwih, Kedampal, Keloncing, Penatahan, Pesagi, Piak, Piling, Puakan, Rajasa, Sangketan, Soka, Tegallinggah, Tengkudak, Wongaya Betan.
2. Villages of Jatiluwih, Mangesta, Keloncing, Penatahan, Pesagi, Wongaya Gede, Mangesta, Puakan, Rajasa, Sengketan, Tegallinggah,Tengkudak
3. Water Temple Pura Luhur Batukaru
4. Water Temple Pura Luhur Pucak Petali
5. Water Temple Pura Luhur Tambawaras
6. Water Temple Pura Luhur Besikalung
7. Water Temple Pura Luhur Muncaksari

D. Royal Water Temple Pura Taman Ayun

District of Mengwi, Badung Regency

This site encompasses the temple Pura Taman Ayun.

Overview of the proposed sites

The nomination is comprised of five component parts. The first is the great water temple Pura Ulun Danu Batur, located on the crater rim overlooking Lake Batur, which is believed by Balinese farmers to be the home of the Goddess of the Lake, Dewi Danu. The crater lake of Batur is also included as a component part of this nomination, because it is regarded by Balinese Hindus as the ultimate source of water for the subaks, and in a more general sense for all life on the

island of Bali. This water temple and associated lands are directly managed by the people of the village of Batur, following ancient traditions. They are assisted by a steady stream of contributions from more than 250 subaks, as well contributions from other segments of Balinese society. As will be described below, this temple is considered to be the supreme subak temple of Bali. The second component part is the Batur crater lake. This lake is located in a volcanic caldera and has no outlets, but it is a very large and deep reservoir of water that feeds the groundwater system which augments the flow of rivers feeding irrigation canals.

The third component part consists of a cluster of subaks, temples and villages located at high elevation in the valley of Pakerisan (Fig. 2.1). Archaeological evidence indicates that this valley was the cradle of Balinese civilization in the late first millenium C.E. Today, waters from natural springs enclosed by ancient temples provide irrigation water for ancient rice terraces where native Balinese rice is still grown in the traditional manner by centuries-old subaks. The Pakerisan site represents the origin and historic continuity of the subak system, and dramatically illustrates its relationship to the formation and growth of early Balinese kingdoms.

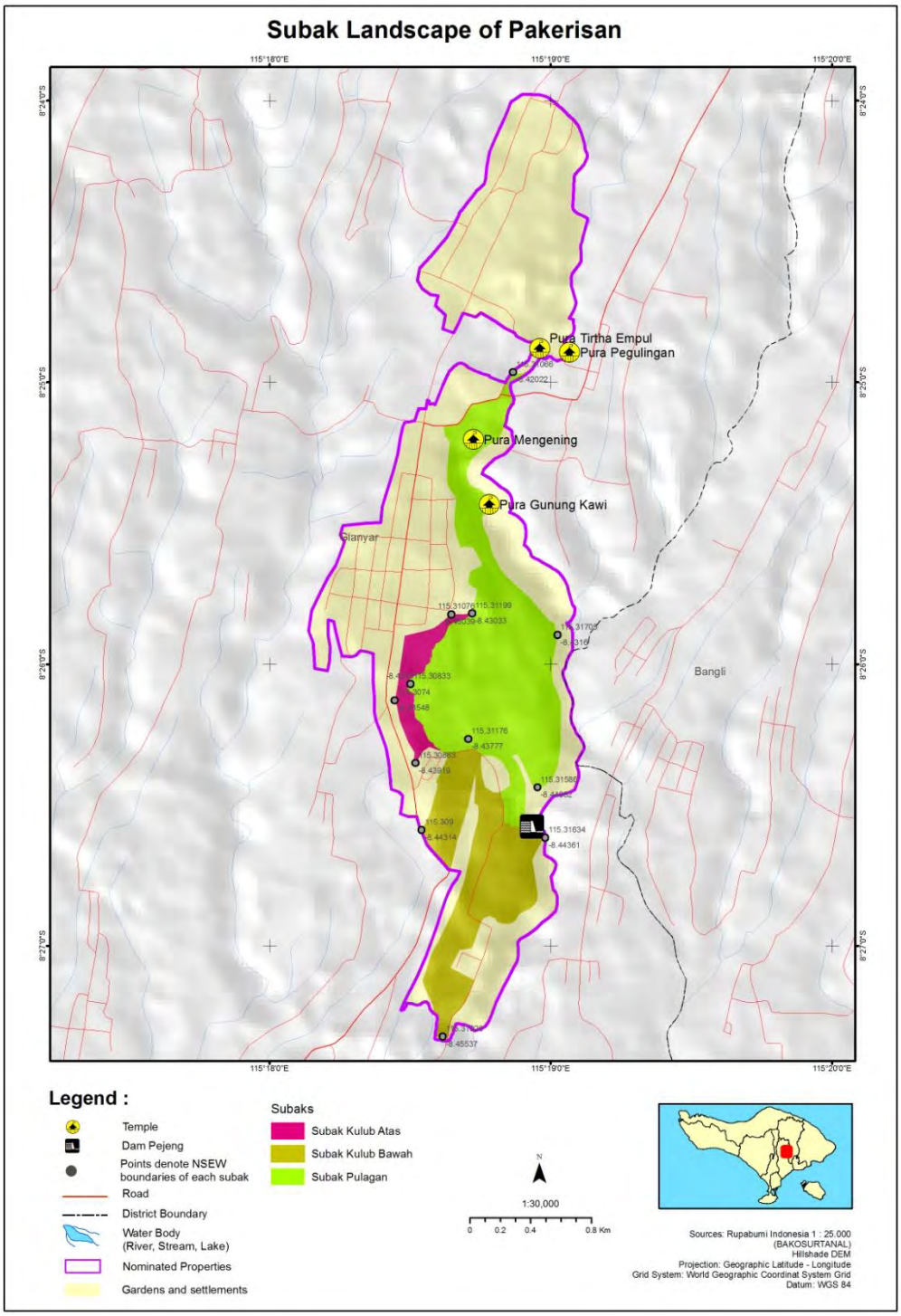

Figure 2.1: Map of the Subak Landscape of Pakerisan Watershed

The fourth component part comprises the subaks, forests, lakes, springs, temples and villages clustered around Mount Batukaru. Five important temples define the boundaries of a region called “Catur Angga Batukaru”, the Four Components of Batukaru, located downslope from the temple of Mount Batukaru.

Supreme among them is the central temple of Pura Luhur Batu Karu, dedicated to the deity of the mountain. The other four temples mark the boundaries of a sacred territory which is regarded as the highest (*utama*) *mandala* or sacred landscape of Tabanan. These five temples are sacred to the subaks. Periodically, when the priests believe that the land needs cleansing and purification, the deities of the temples are taken on a pilgrimage to the sea temple, accompanied by representatives from all the local subaks and villages.

This site exemplifies the multi-layered structure of the Balinese subak system, and its historic expansion in western Bali. From the standpoint of Bali as a whole, this site is significant because it encompasses two mountain lakes and associated temples, which are regarded as the origin of waters for all the subaks downstream in the western “ricebowl” region of Tabanan. At these lake temples, the subaks of the former kingdom of Tabanan perform the “Water-opening” rituals that mark the beginning of the annual cycles of cultivation. In addition to its importance as a sacred water-origin source for western Bali, Batukaru is also home to a local cluster of ancient water temples and subaks, which have so far successfully resisted pressures for commercial development.

Forests and terraced landscape
below Mount Batu Karu

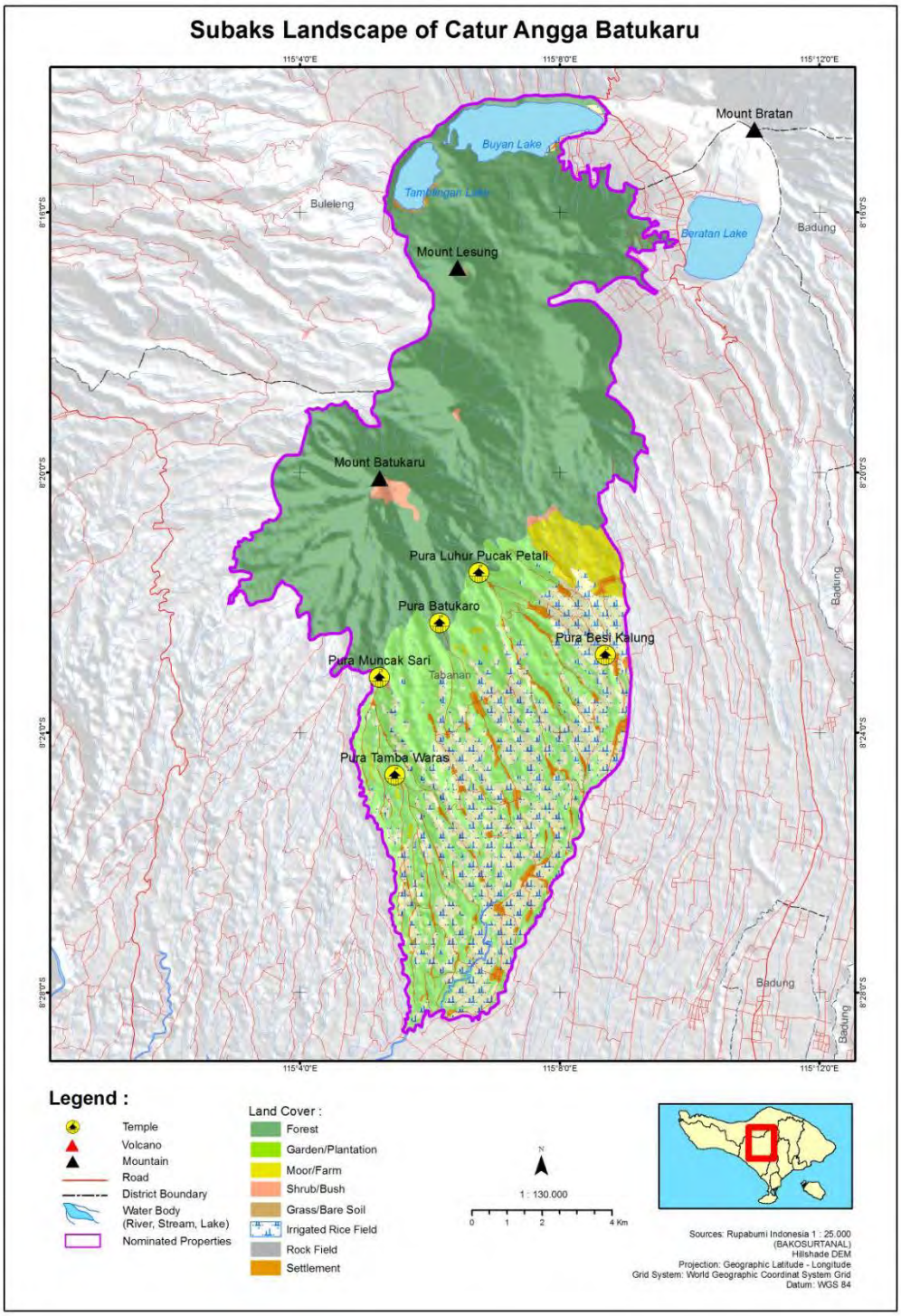

Figure 2.2: Map of the Subak Landscape of Catur Angga Batukaru showing the entire component, including lakes, forests, subaks and major water temples

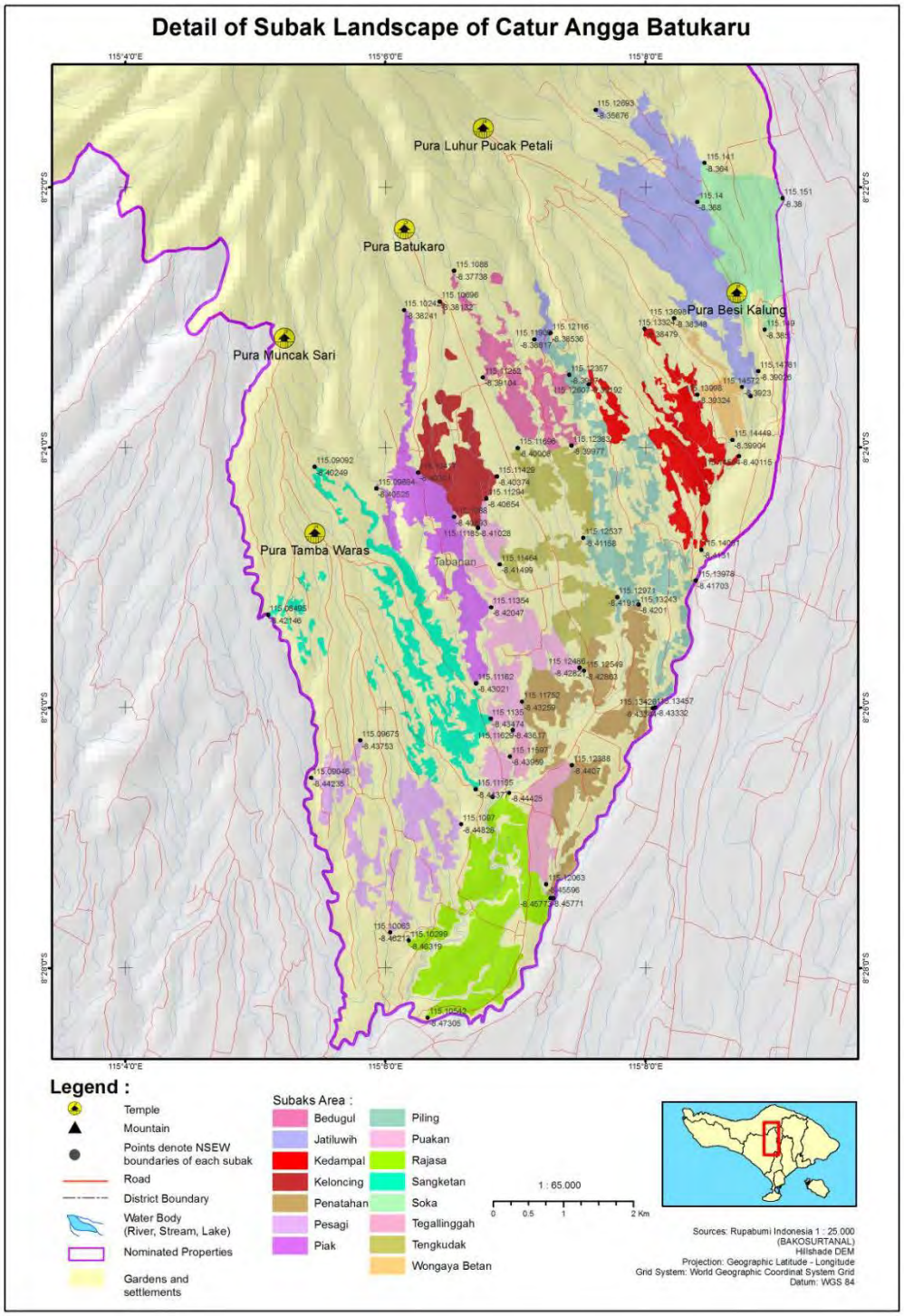

Figure 2.3: Detail map of the Subak Landscape of Catur Angga Batukaru highlighting the subaks and major water temples

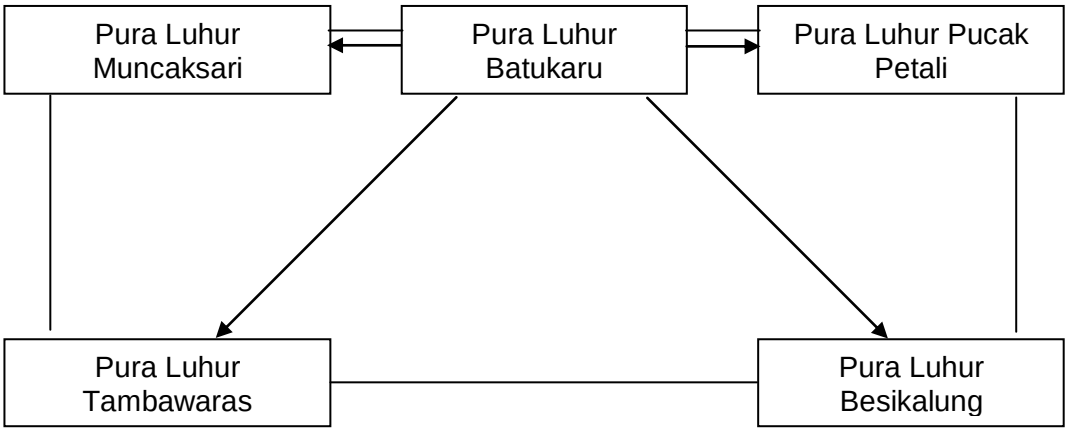

Table 2.1 The five temples that define the sacred landscape of Catur Angga Batukaru, in northern Tabanan regency.

As in the Pakerisan site, the subaks of this sacred region of Catur Angga continue to grow native Balinese rice using traditional technology. For example, rice stalks are harvested with a blade concealed in the palm of the hand, called *ani-ani*, to honor the Rice Goddess at the time of her sacrifice. This traditional technology is found today in only a few subaks, most prominently those that are included in the Pakerisan and Batukaru sites. Most photographers would agree that the most beautiful terraced landscapes in Bali are found in these two sites. The subaks enclosed within the sacred landscape of Catur Angga Batukaru acknowledge a special responsibility to sustain the purity of this landscape, and consequently have so far successfully resisted pressures to abandon traditional agricultural practices. They are now threatened by commercial development, lending urgency to their nomination as a World Heritage site.[7]

The fifth component part is the great temple of Taman Ayun, located at the heart of the former kingdom of Mengwi in the Regency of Tabanan. Here all of the subaks of the former kingdoms of Mengwi and Tabanan come to receive holy water from the mountain lakes, annually collected by the Mengwi royal family accompanied by a delegation of water temple priests and subak heads. This temple represents the final phase of the downstream development of the subak system, in which Balinese kings became active partners with the subaks in the

[7] J. Stephen Lansing and James N. Kremer, "A Socio-ecological Analysis of Balinese Water Temples", in Indigenous Knowledge Systems: The Cultural Dimension of Development, ed. D.M. Warren, L. Jan Slikkerveer and David Brokensha. London: Intermediate Technology Publications, 1995: New York: 258-268.

management of the terraced landscape. While the major responsibility for the temple is shared by the village of Mengwi and the royal family, twenty three subaks also make substantial contributions to its upkeep and ritual cycles. This temple is ritually connected with the subaks and lakes of the upstream Catur Angga Batukaru site. But it also connects that landscape with the much larger subak landscape of southern Tabanan and Badung. It is the supreme downstream water temple for the largest congregation of subaks in Bali.

The criteria for the selection of these components includes the archaeological and historical significance of their water temples and associated subaks; the receptiveness of local inhabitants to inclusion in the World Heritage nomination; the desire of the local farmers to continue growing native Balinese rice; the ecological viability of each site, and the way each site exemplifies a particular historical manifestation of the subak system. A participatory mapping approach was used to define the boundaries of each component part, with the enthusiastic assistance of subak and village leaders as well as representatives from many government departments, including Archaeology, Forestry, Culture and Agriculture. The sites chosen for the nomination include three of the four Balinese crater lakes, which have great religious significance for the Balinese people, and the most sacred forests and springs. (The fourth lake, Beratan, was not included at this time because of the extent of recent commercial development around the lakeside). The supreme water temple associated with the crater lake on Mount Batur was selected because of its unique historic and religious importance for all subaks. The Pakerisan site encompasses the key sites associated with the historical origins of the subak system, and the wet-rice kingdoms that it made possible. The lakes, forests, subaks and water temples within the sacred landscape of Catur Angga Batukaru are the largest and most sacred region in which the subak system continues to function with minimal disturbance from inappropriate or unplanned development. The royal water temple Taman Ayun continues to play a vital role in the perennial rites of the subaks of Western Bali, and exemplifies the large-scale coordination among subaks achieved in their last phase of development.

Relationship to the Philosophy of Tri Hita Karana

The philosophy which governs the establishment of *subak* and their daily activities is the Hindu-Balinese concept of *Tri Hita Karana* (three causes of goodness or prosperity).[8] According to this belief, prosperity and goodness can only be achieved through an harmonious relationship between humans and the gods (Parhyangan), their fellow men (Pawongan), and nature (Palemahan). Humans should maintain their harmony with nature and the divine through mindful worship and prayer. Hence, ceremonies become an important part of the rice cultivation cycle and various temples associated with subak are erected, from a simple shrine at the water inlet to the large multi-subak temple of Lake Batur, which is considered to be the ultimate source of water in Bali (Pitana 2005). At the same time, humans are part of nature. Therefore, humans should live in harmony with one another as well as with other living creatures and the natural environment.

Thus, humans have a social responsibility to obey customary laws and regulations, especially those pertaining to public domains such as land and water use, legal transactions of land transfers, and collective religious ceremonies. Humans may benefit from nature, but should not over-exploit it. It is their responsibility to maintain the environment sustainably and conserve nature for future generations. [9] It is this philosophy that has long been the driving principle for Balinese in creating and maintaining the spectacular landscape of the rice terraces with their various subak-temples and irrigation works.

The concept of Tri Hita Karana is expressed differently in different water temple networks, with regional and even local variation. There are nonetheless attributes common to all subaks. As anthropologist Clifford Geertz observed, it is precisely these 'surface variations' of Balinese communities that ultimately exemplify and illuminate the underlying level of profound common agreement on fundamental values.[10]

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[8] *Tri* (three); *hita* (Skt ,benefit, advantage, profit, good, welfare etc), *karana* (Skt, the act of making, producing, affecting). P.J. Zoetmulder, Old Javanese English Dictionary. KITLV, s-Gravenhage, Martinus Nijhoff, 1982.

[9] Lorenzen, Stephan and Rachel Lorenzen. 2008. "Institutionalizing the Informal: irrigation and government intervention in Bali." Development 51:72-88.

[10] Clifford Geertz.1959. Form and Variation in Balinese Village Structure. American Anthropologist 61:991-1012.

2.a Detailed Description of the Property

A. Supreme Water Temple Pura Ulun Danu Batur and Lake Batur

Pura Ulun Danu Batur

Perched dramatically on the rim of Mount Batur overlooking the crater lake, the supreme water temple Pura Ulun Danu Batur is a collection of nested stone courtyards enclosing an array of towering shrines and pavilions dedicated to the worship of a pantheon of 45 deities, foremost among them the Goddess of the Lake, who is said to make the rivers flow and bring prosperity to the land. According to legend, in ancient times the supreme god who resides on Mount Meru broke apart the summit of the mountain and sent the pieces to Bali to become abodes for his son and daughter (Goris 1929, 1954). His son became the first male god of Bali and took up residence atop the larger fragment, which became the volcano Mount Agung. The smaller fragment, which became Mount Batur, contained a vast and deep crater lake. On the floor of the lake the daughter of the high god built a palace and took the name *Dewi Danu*, Goddess of the Lake.

The temple's supremacy reflects the structural logic of water temples.[11] In general, the congregation of a water temple consists of all the farmers who share water from a particular source, such as a weir or spring. Because the crater lake is regarded as the ultimate origin of every spring and river, its congregation

[11] J. Stephen Lansing, *Perfect Order: Recognizing Complexity in Bali.* Princeton University Press, 2006.

appropriately includes all subaks. As a water temple, the Pura *Ulun Danu Batur* temple is endowed with a unique collection of attributes: it is at once the most universal subak temple, the sacred summit of the cosmic mountain, the sole source of the most potent holy water and the only temple where the priesthood is selected by the gods themselves. These impressive symbolic associations combine with its spectacular location on the crater rim to endow the temple with an aura of other-worldliness, especially on the days when its greatest treasure, an ancient gamelan orchestra, plays stately music while the temple's vast courtyards become carpeted with flower offerings left behind by thousands of worshippers. This temple is a pilgrimage site and redistributive center for more than 250 Balinese subaks, which bring offerings each year during the festival of the Goddess of the Lake, held for ten days around the full moon of the tenth month on the Balinese sacred calender.[12] The temple also plays an important role in the practical affairs of the subaks, in two respects. First, if a community wishes to construct a new irrigation system and subak, they request advice and assistance from the Pura Ulun Danu Batur temple. The creation of such a new subak is shown in the ethnographic documentary film *The Goddess and The Computer* (Lansing and Singer 1988). Second, the priests of the temple are often called on for advice when there is a dispute among subaks over water rights.[13]

Site boundaries and buffer of Batur Temple and Lake

This site consists of two component parts, the temple Pura Ulun Danu Batur and Lake Batur itself. The area within and around the Batur caldera includes a great many temples and shrines, many of which play a role in the annual cycle of rites associated with the Goddess of the Lake and the subaks. An argument could be made that all of them deserve to be included in the World Heritage site. However, a participatory mapping process conducted with the representatives of the Temple concluded that this is neither practical nor indeed necessary. It is not practical because the shrines and temples are scattered over a very large area, some of them in or near sites where commercial or agricultural development has already occurred. Fortunately, according to the religious authorities of the temples, it is not necessary to include these shrines and temples because their

[12] J. Stephen Lansing, *Priests and Programmers: Technologies of Power in the Engineered Landscape of Bali.* Princeton University Press, 1991. Revised 2nd edition 2007.

[13] Ibid.

ritual functions are encompassed by the supreme temple. Thus for example there are eleven small shrines around the lake, from which water is fetched to create holy water (tirtha), in a ritual sequence that culminates at the supreme temple.

The physical boundaries of the temple component are defined by the outer walls of the temple. A buffer extends from the outer perimeter wall of the temple to encompass inhabited land which belongs to the village of Batur. This is in keeping with both Balinese tradition and with Indonesian law. While the great temple is open to all and receives support from many individuals and institutions, primary responsibility for the upkeep and maintenance of the temple belongs to the village of Batur. In Bali, provincial zoning restrictions empower local communities to establish a protected buffer zone around major temples.[14] A detailed explanation of the legal basis and rationale for this buffer (and the other buffer zones included in this nomination) is provided in Chapter 5. Lake Batur is included within the nominated area because it is symbolically and ritually identified with the temple, representing the symbolic source of water for the subaks. Indeed Lake Batur and the temple Ulun Danu Batur (Head of Lake Batur) are inextricably linked in Balinese cosmology. Following government regulations, the border of the lake is surrounded by buffer zone consisting of a 100 meter perimeter.[15] The lake is managed by the Department of Forestry, which is represented in the Governing Assembly of the Cultural Heritage. The temple is strictly governed and managed by the village of Batur, who are also represented on the Cultural Heritage Governing Assembly.

The relationship between the village of Batur and the great temple is defined by the Balinese concept of *pengempon*. Every Balinese temple receives primary support from a specific congregation who are jointly responsible for the upkeep of the temple and the performance of its ritual cycle. The term for this relationship in Balinese is *pengempon*. In addition, many temples receive additional support from other individuals or segments of Balinese society. Support for the highest ranking temples, such as Pura Ulun Danu Batur, is shared with the entire Hindu

14 See Regulations of Bali Province Number 5 (2005) Section 19, which clarifies zoning for protected sacred sites, based on local awig-awig (customary law).

The Republic of Indonesia Act No.5 of 1990 concerning environmental conservation; the Republic of Indonesia Act No. 41 of 1991 concerning forest conservation, and The Republic of Indonesia Act No.32 of 1990 concerning conservation establish the following protected buffer zones: for lakes 100 meters; springs 200 meters; rivers from 50 to 100 meters; catchments 100 meters and conservation forests 500 meters.

community or *umat*. But unlike the pengempon relationship, the nature of this support is essentially voluntary; the Balinese term is *penyungsung*.

While the landscape surrounding the lake is of great geological interest, as a result of the participatory mapping process it is not included within the nominated area for two reasons. First, the significance of this site derives from the importance of the lake and the lake temple for all Balinese subaks, representing the divine gift of life-giving waters. Second, the lands around the lake and within the Batur caldera are presently zoned for mixed use. The forests and lands that surround and encompass the main active vents are managed by the Forestry Department and are zoned for limited agricultural and recreational use, so that local farmers can plant gardens, but are not permitted to cut the trees. These uses are deemed appropriate and do not conflict with the role of Pura Ulun Danu Batur as Bali's supreme water temple, nor with the conservation status of Lake Batur.

B. Subak Landscape of Pakerisan Watershed

This site encompasses the oldest known irrigation system in Bali, and the archaeological remains of the early wet-rice kingdoms that emerged in subsequent centuries. It represents a continuous living tradition of ecological management by the subaks that has continued for over a millenium. The nominated area includes the lands and watercourses of three subaks, Pulagan and Upper and Lower Kulub, as well as four ancient water temples that are also major Classical archaeological sites, and a cluster of royal temples and monasteries associated with the development of irrigated rice agriculture at the dawn of Balinese civilization. The proposed World Heritage site, which administratively falls within District Tampaksiring in the Regency of Gianyar, will encompass the following features:

- The subaks of Pulagan and Upper and Lower Kulub
- The villages of Kulub, Tampaksiring and Manukaya Let, home of the farmers who form the congregations of these three subaks
- The natural spring and associated ancient water temple Pura Tirtha Empul, which are regarded as the symbolic source of the Pakerisan river. One of the earliest royal inscriptions that refers to irrigation, dated 962 AD, mentions a dam at this site. Today, after more than a thousand years, the irrigation

system that originates at the spring of Tirtha Empul continues to supply water to the subak Pulagan. Archaeologist John Schoenfelder (2003) states that this was among the first canal irrigation structures in Bali. Tirtha Empul functions as both a subak temple and a regional pilgrimage destination.[16]

- The ancient water temple Pura Mengening, a restored free-standing *candi* temple dating from the 11th or 12th century AD. It is associated with a holy spring that is the water source for downstream subaks.
- Pura Pegulingan, a 9th century Buddhist stupa found and restored in a temple that lies amidst rice fields at the top of a slope overlooking Pura Tirtha Empul, and the associate subaks. Here the stone containing the ancient royal inscription Prasasti Manukaya (described above) is kept and venerated by the people of Manukaya.
- The rock-cut royal memorial *candi* monuments and monasteries located along the Pakerisan at Gunung Kawi, dating to the 11th century AD. These royal tombs and monastic retreats testify to the prosperity attained by early Balinese wet-rice kingdoms, associated with the emergence of the ancient irrigation systems, subaks and water temples.

Collectively, the sites of Pakerisan constitute an ancient and still functioning water temple network that played a formative role as one of the cradles of Balinese kingship and religious traditions.[17] As a cultural landscape that bears witness to past as well as present practices, Pakerisan is an exemplary manifestation of the Balinese reverence for water in both sacred and practical contexts.

Within the three administrative villages (*desa dinas*) contained within this component part, most of the farmers live in several traditional communities (*pakraman*) which are the principal support or *pengempon* for the major water temples within the site. In return for this support, the families which provide *pengempon* receive perpetual usufruct rights to the land on which their houses are built. Importantly, it is believed that the welfare of the larger community

[16] Schoenfelder, John W. The Co-Evolution of Agricultural and Sociopolitical Systems in Bali. Bulletin of the Indo-Pacific Prehistory Association 20: 35-47.

[17] Vernon L. Scarborough, John W. Schoenfelder and J. Stephen Lansing. 2000. "Early Statecraft on Bali: The Water Temple Complex and the Decentralization of the Political Economy". *Research in Economic Anthropology*, Vol. 20: 299-330.

depends on the successful performance of pengempon. Hence the pengempon relationship is a key ingredient in the ongoing implementation of the tri hita karana approach to the conservation of the cultural landscape of Bali.

Temple	Community of support (pengempon)	Number of households Responsible
Pura Pegulingan	Basang Ambu, Manukaya	493
Pura Tirtha Empul	Manukaya Let, Manukaya	147
Pura Magening	Sareseda, Tampaksiring	48
Pura Gunung Kawi	Penaka, Tampaksiring	66

Table 2.2: Pengempon relationship between communities and temples in Pakerisan

Subak Meeting in Pakerisan

B.1. Pura Pegulingan

Pura Pegulingan

Pura Pegulingan overlooks Pura Tirtha Empul, which is 200 meters to the west. The primary monument at this site is a Buddhist stupa (12 m high and 3 m diameter at the base) dated to the 9th century. The present structure is a reconstruction built in the 1980s atop a foundation of archaeological significance, a large collection of masonry and statue fragments, and a remarkable model stupa. In total, there are 34 structures in the temple complex, mainly pelinggih shrines for ceremonial purposes, all of which face Mount Agung, in accordance with Balinese cosmology.

This temple exemplifies the interconnection of villages and subaks in Bali. Pura Pegulingan is both a community temple for the village and a subak temple (*ulun swi*). During annual temple festivals, farmers bring offerings of rice bundles to the *Ulun Swi* subak shrine located in the middle courtyard of the complex, and

Harvest offerings in a Pakerisan subak temple

perform rituals to assure the fertility of 25 hectares of rice fields irrigated by the springs. Like other temple structures in the Pakerisan area, the stupa features a base, a central body, and a top section, which in turn reflect the three worlds or Tri Bhuana. The foot of the stupa is surrounded by a moat which is about one meter wide. It is octagonal in shape and the sides are connected by stones, arranged to form spokes. In the centre there is a small stupa, around 55 cm high, in which some artifacts were found, including a sheet of gold containing some mantras, a gold Buddha image, a stupika, and a stone fragment of a Buddha sculpture. The octagonal design with a single centre reflects the Nasamanga Mandala wisdom, which indicates that the centre be surrounded by eight wind directions, the essence of Balinese cosmology. On the body of the stupa (andha) is a niche that originally contained Buddha sculptures, but they have not been found again or remain only as fragments. On top is a yasti: a stone mast with rings around it that becomes smaller and pointed at the top.

The architectural symbolism of Pura Pegulingan is well suited to communicate the desire of the Balinese community to maintain harmonious relationships with God, with fellow human beings and with nature (tri hita karana). A harmonious relationship with God is centered in worship at the pura's stupa and pelinggih. Harmonious relationships with fellow human beings are reflected in the social relationship characterized by tolerance for fellow worshippers of different creeds

(Buddhist and Hindu). Meanwhile, the harmonious relationship with nature is manifest by the ongoing rituals performed by the subak.

B.2. Pura Tirtha Empul and Subak Pulagan

This beautiful, ancient, and functional spring temple is an important pilgrimage destination for Balinese who revere it as the source of the Pakerisan River, which provides water for the extensive rice fields in the Pejeng area to the south. The ancient subak of Pulagan receives its irrigation water from the dam immediately downstream from the temple spring. **The temple is managed and supported by the village of Manukaya Let.** The temple is located in a rather steep-sided valley carved by the Pakerisan river. At the top of the slope on the western side of the pura (temple) is Tampaksiring Palace, which is used for state functions by the national government of Indonesia. (Because the Palace is managed directly by the National Government of Indonesia, it is not included in the World Heritage nominated area).

Water Reservoir of Pura Tirtha Empul

Often referred to as Bali's holiest spring, the upwelling of water originates in the most sacred section of the temple (the *jeroan*).[18] From there, the sacred water flows through spouts and ponds used for ritual bathing and for the collection of holy water to be used in ceremonies elsewhere. At a weir a short distance

[18] Stutterheim, Willem F. 1927. Voorloopige Inventaris der Oudheden van Bali [II: Afdeeling Zuid-Bali; Onderafdeeling Gianjar]. *Oudheidkundig Verslag van de Oudheidkundige Dienst in Nederlandsch-Indië* 1927(3-4): 139-150.

downstream from the temple, this water then passes into the channel that waters the fields of Subak Pulagan. In return, the subak contributes rice, eggs, and beautiful offerings made of flowers, palm leaves cut into origami-like shapes, gilt paper and figures formed from colored rice flour (*dangsil, jerimpen, daksina etc)* during annual festivals at the temple, on the full moon of the fourth Balinese month. Unlike most neighboring subaks, Subak Pulagan does not consider itself obligated to offer similar contributions (*suwinih)* to the supreme water temple Pura Ulun Danu Batur, because their water originates in the temple's springs rather than the lake. This assertion of self-sufficiency underscores the importance of the spring at Tirtha Empul, and also reflects the relative antiquity of the Subak Pulagan irrigation system as well as the contemporary variation among Balinese subak referred to above.

Another view of terraced fields and forests north of spring temple Tirtha Empul, Pakerisan site

Pura Tirtha Empul is divided into three courtyards: the outer yard called the *jaba sisi,* the middle yard or *jaba tengah*, and the inner yard or *jeroan*. The three yards represent the three realms of Balinese cosmology (*Tri Bhuana*), as well as the three philosophical elements of Tri Hita Karana. The relationship between humans and nature, called *palemahan*, is manifest in the gardens and community ablution facility in the *jaba sisi.* Social activities among parishoners conducted in a meeting pavilion (*wantilan*) in the *jaba tengah* embodies harmonious interpersonal relations among human beings, or *pawongan*. In a pond on the western side of the *jaba tengah*, visitors to the pura purify their souls to eliminate negative forces and restore positive power found in human beings. In the inner *jeroan*, the harmonious relationship between god and human beings, called *parhyangan*, is ritually celebrated.

Terraced fields and forests north of spring temple Tirtha Empul, Pakerisan site

The entrance to the inner courtyard (*jeroan*) is located on the west side and is marked with a *gapura bentar* (split gate). Behind the *rana gapura* at the entrance gate ancient objects such as a lingga yoni, a Ganesha statue, and a statue of Nandi are found. These ancient objects were presumably statues from a Hindu temple, worshipped at the beginning of the pura's establishment. The inner yard features pelinggih (shrines) engraved with beautiful carvings. All the pelinggih are arranged so that worshippers face Mount Agung, which is regarded as the center

of Bali's sacred landscape. The most sacred place in the Pura Tirtha Empul is the large altar at the far end of the inner yard called Tepesana. Made of stone terraces and square in form, the altar honors the god Indra, one of the most important deities in the Hindu religion. There is also a fenced pond containing the spring that emerges from the eastern side of the yard. This spring is large and produces a correspondingly large water output flow, which, as noted, supplies the subak irrigation system and the Pakerisan River.

Immediately to the north of the temple there are temple lands (*labo pura*) consisting of rice fields, which are farmed by sharecroppers who divide the harvest with the temple. These temple lands are situated in a steep-sided depression, ringed by forests. The traditional law (*awig-awig desa*) of the village of Manukaya precludes commercial development of these lands, which thus form a protective buffer zone for the temple and its spring. To the north of these temple lands is the village of Manukaya Let. This village is also included in the nominated area, because the village community is responsible for the temple and temple lands. In this way, the traditional village community is assured of appropriate participation in the governance of the World Heritage site.

B.3. Pura Mengening and Subak Kulub

This active traditional water temple, situated between Pura Tirtha Empul and Pura Gunung Kawi, on the slope of the steep valley of the Pakerisan, is home to a stone-block temple building (prasada) similar in form to the candi reliefs at Pura Gunung Kawi. This prasada owes its location to the presence of a holy spring, over which it towers. It is the water-origin temple for the subak of Kulub, where the farmers of Kulub give thanks for the waters that flow and receive blessings for their harvests. As at Pura Tirtha Empul, the walled spring pond feeds into an irrigation channel that irrigates the rice terraces of Subak Kulub to the south. Along the way, this canal passes by the archaeological sites associated with the kingdoms and monastic communities that grew up in this valley, notably the twelfth century royal tombs of Gunung Kawi.[19]

[19] Gunung means hill or mountain. Kawi has several meanings: the Balinese name for the Old Javanese language; the poetry written in that language, and also the title of a poet or composer of verse in that language.

Architecture of Prasada Agung (Pura Mengening) represents a sacred mountain

To enter Pura Mengening, one has to climb steep stone steps along the sloping riverbank. The site features a 5.5 meter-high base, which represents one of Bali's best-preserved free-standing shrines of the Classical Period. A central feature within the temple is a stone structure called Prasada Agung. The structure features three spatial components, which symbolize the three worlds (Tri Bhuana) and reflect the principles of Tri Hita Karana. The base of the temple features objects called peripih representing natural elements (palemahan), while the roof features peripih symbolizing the gods (parhyangan). Within the body of the temple is a lingga yoni, the central place of worship, which represents the human world.

B.4. Pura Gunung Kawi (rock cut royal tombs, temple and monasteries)[20]

Bridge to Gunung Kawi Temple

[20] Stutterheim, Willem F. 1925. Voorloopige Inventaris der Oudheden van Bali [Afdeeling Zuid-Bali: Onderafdeeling Gianjar; District Oeboed]. *Oudheidkundig Verslag van de Oudheidkundige Dienst in Nederlandsch-Indië* 1925(3-4): 150-170.

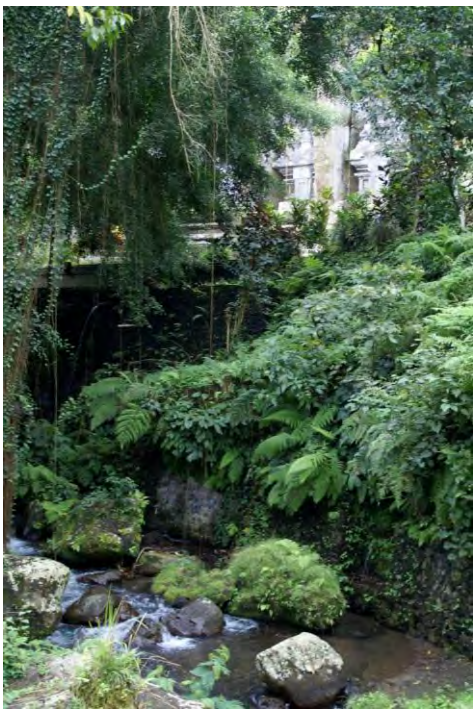
Downstream from Pura Tirtha Empul, the valley of the Pakerisan deepens into a gorge, the sides of which are shaped into narrow rice terraces irrigated by the waters of Pura Tirtha Empul's spring. The site of Pura Gunung Kawi lies about a kilometer to the south of Pura Tirtha Empul, at the bottom of this gorge. Beyond its significance as a feature of the landscape of the subaks of Pakerisan, Pura Gunung Kawi possesses Outstanding Universal Value in that it bears witness to the antiquity of both reverence for water and skill in its management; both of these quintessentially Balinese traits are palpably demonstrated by the ancient rock-cut channels that lead to water spouts positioned in front of each candi. Because they were cut into living basalt instead of built from stacked blocks, parts of Pura Gunung Kawi have survived the centuries in exceptional condition relative to the best-known free-standing monuments of Java. The candis' near-sameness in size and form suggests a connection to themes of alliance visible in present-day Bali (and enshrined in the interpersonal harmony tenet of Tri Hita Karana), even as their design shows a strong link to the Classical states of Java, and their siting and monumental size illustrate both the temporal power of the early Balinese dynasties and their dependence upon the irrigated landscape.

Rock cut temple of Gunung Kawi

To the north of the temple group are two rows of rock cut temples. One row on the north side of the Pakerisan River consists of four temple structures and some meditation rooms, which are chiseled into the breccia stone on the wall of the slope (named the Group C Temple). The structure of this chiseled temple is 7 m high. Other rows of chiseled temple are found on the east wall of the Pakerisan River (The Group A Temple), across from the row of temples on the west wall of the river bank. There are five temple and two meditation rooms in this row. Some

temples are inscribed with Kadiri Quadrate characters. The inscription states that this structure is dedicated to the king who died in Jalu. The name 'Jalu' is synonymous with Keris and the name of the river that divides the groups of temple the Pakerisan River. In front of the row of temple, there is a batur (water receptacle) for water that is channeled to various fountains. In front of the batur approximately 10 m in the direction of the river, a rectangular pond parallel to the rows of temple is found. In the pond, there are fountains from which water still flows.

To the south of the rows of temple, niches and structures that resemble houses were chiseled into the stone of the sloping wall (Group B Temple). These spaces or rooms are believed to have been places of meditation for priests. The size of these monastic establishment and their close proximity to the great royal tombs show the close association between the ancient water temples and irrigation systems, and their links with the Balinese cosmological concepts of agama tirtha (religion of holy water) and Tri Hita Karana. While the monks and kings are gone, their unbroken legacy survives in the terraced landscape and the ongoing rites of the subaks. Today, these rites are performed in a temple situated directly in front of the ancient monastic niches.



Pakerisan River with 12th century tombs of Gunung Kawi

Around 80 m downstream from this group, there is a group of structures carved from rock on the steep slopes of the riverbank on the eastern side of the Pakerisan River. These carved rooms are variously sized spaces, square with two windows, to the left and to the right of the entrance door. The top is carved to resemble a roof and gives the impression of a house, and local residents describe the niches as griya pedanda or priests' homes. Approximately 250 m southwest of the entrance gate to the temple complex, a rock cut temple and groups of meditation houses are carved into the stone walls on the west bank of the Pakerisan River. In the lower part of the rock cut temple roof, an ancient inscription was found but is indecipherable due to its deteriorated condition.

Architecturally, the rock cut temples in the Pura Gunung Kawi complex highlight the ritual connection to water illustrated by the proliferation of water channels, which are carved into the sloping river banks at the temple site. From the Classical period to the present, participants at temple ceremonies in Pura Gunung Kawi have purified themselves under the fountains and received blessings from the holy water for a successful harvest.

B.5. Subaks Pulagan and Kulub

Rice Field at Village of Kulub

As mentioned above, the ancient and still-functioning subaks of the Pakerisan site are defined by their relationship to these water temples. The spring at Pura Tirtha Empul is the source of irrigation water for subak Pulagan, while subak Kulub receives its water from the spring at Pura Mengening. In addition, Pura Pegulingan is the central site of worship for Subak Basangambu. As well as the major temples described above, the proposed Pakerisan cluster site includes the lands, channels, and smaller field shrines and altars associated with these subaks. While the narrow terraces on the western slope of the gorge containing Gunung Kawi are watered from the channels of both systems, the bulk of Subak Pulagan's fields lie south of Pura Gunung Kawi on flatter land immediately southeast of the houses of Pakerisan, with the fields of Subak Kulub (upper and lower) to their south. In each case, the majority of the subak's fields lie over two kilometers from the source spring. Nonetheless, these springs are relatively accessible water sources when compared to the ravine-bottom river weirs that must be used by most subaks, with less tunneling and shorter channels required to bring the water to the fields. The historical evidence indicates that this site was among the first locations where wet-rice agriculture developed in Bali, due to the relative ease with which the flow of spring water could be captured and channeled to irrigate fields downslope (Scarborough et al. 2000). The site extends south along the Pakerisan river and encompasses the small village of Kulub and a major irrigation dam, the Dam Pejeng, which provides water for many downstream subaks. This dam is managed by the Department of Public Works.

Water temple of Pura Luhur Batukaru

Site boundaries and buffer of Pakerisan

In summary, the nominated area for this component part is a continuous area that encompasses all the subaks, temples and archaeological sites described above along with the villages of Kulub, Tampaksiring and Manukaya Let. These villages are included within the nominated area because they are the home of the farmers of the subaks, along with other families who are responsible for the care of the temples and temple lands. The northern boundary of the nominated area is defined by the village territory of Manukaya Let and the adjacent rice terraces of Subak Basangambu, based on existing Regency zoning records and confirmed by participatory mapping.

The eastern boundary is 100 meters to the east of the Pakerisan river. This boundary extends to the summit of the river valley and encompasses the rice terraces of the subak Pulagan. Provincial zoning regulations already protect lands lying within 100 meters of a major river, so no additional protection is required. From the north, the western border of the site is initially based on the western borders of the village of Manukaya Let, which is the *pengempon* (principal support) for the spring temple Tirtha Empul. South of the village, the border extends 50 meters to the west of the temple Pura Tirtha Empul, dividing the nominated area from the Wisma Negara which is managed by the national government and used for state functions. Continuing to the south, the border traces the western perimeter of the village of Pakerisan, home to many farmers of the subaks Pulagan and Kulub. Below the village, the border is determined by the western perimeter of the subaks Kulub Atas and Kulub Bawah. The southern border of the nominated area is the southern boundary of Subak Kulub Bawah.

The buffer zone around this component part is defined by a perimeter extending 100 meters from the outer boundary of the site, except in two locations. As explained above, provincial laws create protected zones around Balinese temples, the size of which depends on the status of the temple. The temple Pura Pegulingan is located quite close to the edge of the site. Hence the radius of the buffer zone bulges eastwards to 250 meters from the western entrance to the temple. This appropriately places the small hamlet of Basangambu within the buffer zone. Basangambu is the principal support (pengempon) for the temple Pura Pegulingan, and has primary responsibility for the day-to-day upkeep of the temple. The buffer zone is also extended just to the east of this temple, to include

the Wisma Negara (National Retreat), a residence built by the former President Sukarno in the 1960's which is now used by the national government for official functions. The grounds of the Wisma Negara abut the perimeter of the site next to the spring temple of Tirtha Empul, and form a natural extension to the buffer zone because they are already carefully conserved by the Provincial government.

The buffer zone around this component part is defined by a perimeter extending 100 meters from the outer boundary of the site, except in two locations. Several laws create protected zones around Balinese temples, the size of which depends on the status of the temple. The temple Pura Pegulingan is located quite close to the edge of the site. The radius of the buffer zone is extended outwards to 250 meters from the western entrance to the temple, and elongated slightly to include the hamlet of Basangambu, which has primary responsibility for the day-to-day upkeep of the temple. The buffer zone is also extended just to the east of this temple, to include the Wisma Negara (National Retreat), a residence built by the former President Sukarno in the 1960's which is now used by the national government for official functions. The grounds of the Wisma Negara abut the NE perimeter of the site adjacent to the spring temple Tirtha Empul, and extend the protected buffer zone.

C. Subak Landscape of Catur Angga Batukaru[21]

The expanse of forests, lakes, terraced rice paddies, intact subak institutions, and corresponding temple network of the Batukaru area exemplify the interconnectedness of Bali's ecological and cultural landscapes. Encompassing two volcanic crater lakes that are regarded as the sacred source of water for subaks in the ricebowl of western Bali, this site extends from mountainous water catchment zones to highland rice terraces in northern Tabanan. It is historically and ritually defined by a cluster of temples, to be described below, as "Catur Angga Batukaru", a sacred region of mountain peaks, forests, lakes and the villages and rice terraces closest to them. The area encompasses the forests of

[21] Catur Angga Batukaru or Catur Angga Batukaru is a region defined by four temples which constitute the four guardians (catur Angga) of Mount Batukaru. These temples are Pura Muncaksari, Pura Tamba Waras, Pura Luhur Pucak Petali and Pura Besikalung. Symbolically, they support the supreme deity of Mount Batukaru, whose principal shrine is the temple Pura Luhur Batukaru, which is also associated with the crater lakes of Tamblingan and Buyan.

Bali's second highest volcano, Mount Batukaru (2276 m), as well as Lakes Tamblingan and Buyan in Buleleng Regency, which are considered to be the source of water for the upland springs that feed Tabanan's irrigated terraces[22].

Lakes Buyan and Tamblingan

Tabanan is widely regarded as the "rice-barn" or *lumbung* of Bali, where fertile volcanic soils have long supported the cultivation of highly-valued local varieties of red, white, and black rice. **Collectively, 17 subaks maintain the traditional farming and irrigation systems in this sacred landscape (Table 2.3).** A primary function of the subaks is to perform temple rituals where subak priests and members honor the gods and goddesses who ensure a fertile landscape and "make the waters flow". Irrigation and cultivation cycles are also pegged to the ritual calendars, and the water temples help facilitate communication and cooperation among dozens of subaks. The subaks of Catur Angga Batukaru, like subaks throughout Bali, regard the Lake Goddess (Dewi Danu) as bestowing the gift of water that feeds their terraces. **Similarly, the subaks in the area maintain a strong connection with the lake temple Pura Gubug Ulun Danu Tamblingan, whose goddess Ida Batara Danu Tamblingan is believed to bestow water for fields throughout the Tabanan region.**

[22] Traditionally, Lake Buyan is regarded as a component of Lake Tamblingan by the water temple priests of Catur Angga Batukaru.

Subak Landscape of Sangketan, in Catur Angga Batukaru

Rice terraces of Subak Wongaya

No	Village community (desa pakraman)	Residence of Farmers from which subak	Approximate number of farmers in this subak who reside in the village (%)
1	Wangaya Gede	Subak Bedugul	100
2	Jatiluwih	Subak Jatiluwih	80
3	Gunung Sari	Subak Jatiluwih	20
4	Mengesta	Subak Kedampal	80
5	Wangaya Gde	Subak Keloncing	95
6	Penatahan	Subak Penatahan	95
7	Pesagi	Subak Pesagi	40
8	Wangaye Gede	Subak Piak	30
9	Piling	Subak Piling	100
10	Puluk-Puluk	Subak Puakan	90
11	Rejasa	Subak Rajasa	85
12	Sangketan	Subak Sangketan	100
13	Soka	Subak Soka	100
14	Tegal Linggah	Subak Tegallingah	90
15	Tengkudak	Subak Tengkudak	65
16	Wongaya Betan	Subak Wongaya betan	80
17	Babahan	Subak Wongaya Betan	10
17	Utu	Subak Wongaya Betan	10

Table 2.3 Relationship of Villages to Subaks & Farmers of Catur Angga Batukaru

Pura Ulun Danu Tamblingan

Within the site, the tranquil temple Pura Luhur Batukaru, nestled in the forest above the rice terraces defines the apex of the collection of major temples that define the sacred region of Batukaru (Catur Angga Batukaru). As one of Bali's

eight (or 6 – see Geertz 1980: 52) cardinal Sad Kahyangan temples, Pura Luhur Batukaru is one of Bali's most important sacred sites and the preeminent temple in the region. Believed to have been built in the 11th century, the temple contains a shrine to the goddess of Lake Tamblingan, the mythological source of Batukaru's springs and rivers, and the mountain god of Mount Batukaru. In the inner courtyard there are three meru tower-shrines to honor royal ancestors. The nearby pond is fed by the river Aa (pronounced "ehe"). In the center of the pond are two pavilions on a little isle, one for the goddess of Lake Tamblingan and one for the god of Mountt Batu Karu. As anthropologist Clifford Geertz first observed, the subak planting cycle in Tabanan begins with a regional "water-opening" ritual at Pura Luhur Batukaru, attended by all heads of subaks (*pekaseh*) and all subak temple priests and a representative of the Tabanan royal family, as well as any subak member who makes the pilgrimage to join in this ceremony conducted to ensure "sufficient and 'effective' water for all terraces in the realm in the coming season."[23] With this, the annual irrigation and rice planting cycle for the region is set in motion. The ritual opening ceremony honoring the rice goddess Dewi Sri is then replicated at all of the downstream subak temples, and subsequently at the smaller bedugul shrines that mark the entrance of irrigation water to each farmer's fields.

Offerings at a shrine in Lake Tamblingan

[23] Clifford Geertz, Negara: The Balinese Theatre State in the Nineteenth Century. Princeton University Press, 1980: 81.

The annual water-opening rituals at the temples of the mountain lakes of Beratan (Pura Ulun Danu Beratan) and Tamblingan (Pura Ulun Danu Tamblingan) involve representatives of all the subaks and royal families of Tabanan and Mengwi. As will be explained below, holy water from these mountain lakes is distributed to the subaks at other temples located downslope. In addition to these region-wide water temple rites, the proposed site also includes a cluster of temples that are supported by nearby subaks which obtain irrigation from the high elevation springs and streams. These temples each have unique ritual and cosmological significance, and jointly define the "Catur Angga Batukaru" mountain landscape that is proposed for inclusion as a component part of the World Heritage site.

For example, one of the four guardian temples, Pura Luhur Besikalung, is located in a forested valley just below the highest-elevation weir on the Ho river. Both sides of the valley are terraced and farmed by the subaks of Batukaru; they are among the most photographed rice terraces of Bali. But today the significance of this temple is not widely appreciated by visitors. Here five subaks make annual offerings for the water they obtain from the Pura Luhur Besikalung weir. The subaks share responsibility for the maintenance and ritual cycle of the temple with three villages. Until now, the temple and surrounding forest and streams are untouched by commercial development. The lands around the temple provide a refuge for wildlife (birds and monkeys) and a place for quiet meditation. The temple is undoubtedly very old and contains several menhirs and ancient stone statues. Twice a year, one of the oldest Balinese royal inscriptions (*prasasti*), dated 917 A.D., is placed in the innermost shrine of the temple for veneration. While only the five subaks that receive water from the Pura Ulun Besikalung weir have primary responsibility for offerings at this temple, twelve more subaks bring harvest offerings (*ngusaba nini*). This is one of the most beautiful and impressive examples of the nested hierarchy of water temples and subaks, both in terms of its cosmological significance and its functional role in the management of water.

Temple Pura Luhur Besikalung. Shrines in the inner courtyard

Pura Luhur Pucak Petali

A second guardian temple, Pura Luhur Pucak Petali, is located to the east of Pura Luhur Besikalung and provides a venue for worship and the coordination of irrigation schedules for another cluster of subaks. Importantly, this temple does not merely duplicate the functions of the Pura Luhur Besikalung temple (providing a venue for subaks to manage –in both a practical and religious sense- their particular water source). In addition, the temple contributes additional layers of meaning connecting the subaks and communities to the landscape. Thus the temple Pura Luhur Pucak Petali is the principal site for the worship of Ida Sesuhunan Petali, the God of Petali who is the chief minister to the God of Mount Batukaru. The temple is also the physical and spiritual manifestation of the connection between forest and field, situated at the edge of the forest above the

villages and subaks of Batukaru and Gunung Sari. At all temple ceremonies, a priest leads offerings of thanks to the god of the forests. This forest deity appears to be unique in Bali's western mountain temples; he is not recognized elsewhere. Pura Luhur Pucak Petali is of primary importance to subak farmers in the region who come to honor the fertility gods and ask for assistance with irrigation canals or to cope with pests, water shortages, or other problems in the ricefields. In addition, Pura Luhur Pucak Petali is an important site for villagers throughout Bali, who make the pilgrimage to the temple to ask for assistance with various afflictions. Located in the nearby villages of Gunung Sari and Penatahan, three other "sister" temples to Pura Luhur Pucak Petali exhibit a similarly strong link with Pura Gubug Ulun Danu Tamblingan and Pura Luhur Batukaru: Pura Ulun Danu Besikalung, Pura Luhur Tamba Waras, and Pura Luhur Muncak Sari.

Nested below Pura Luhur Pucak Petali, both physically and metaphysically, are four subak temples, called *Ulun Swi* (head of the ricefields): Cantik Kuning in subak Gunung Sari; Pejenengan in subak Umadui; and Jung Kook and Penaringan temples in Wangaya Betan. These temples in turn link with numerous smaller *bedugul* water temples that adorn the landscape, marking the sacred space where the Rice Goddess is honored at each farmer's field.

The Batukaru area also features numerous community temples, such as Pura Batu Panas. Surrounded by rice paddies farmed organically by the Subaks of Wangaya Betan and Peselatan in the district of Mengesta, this temple exemplifies the link between community and subak. Although primarily a community temple visited by parishioners throughout the Tabanan region, it is also an important temple for subak rituals. Temple ceremonies at Pura Batu Panas ritually symbolize the connection between the life of the "dry" village and the "wet" terraces of the subak (see Geertz 1980:76, *Pura Balai Agung*). Here subak members make semi-annual offerings of rice bundles, carried to the temple rice barn in honor of the Rice goddess Dewi Sri.

The third and fourth temples that define the Catur Angga region are Pura Tambawaras, which is associated with health, and Pura Muncaksari, associated with prosperity. All four temples possess their own congregations of subaks, and function as "ulun swi" (head of the ricefields) temples. Unlike other *ulun swi* temples, however, these temples are regarded as parts of a greater whole.

In addition to these major temples, each subak possesses its own subak temple; named for the subak that supports it. These are not listed separately because they are common to every Balinese subak, and fulfill identical functions. Along with the subak temples, there are other shrines and temples associated with components of the irrigated landscape. They are structured as follows: every irrigation system begins with a spring, or, more often, a weir in a river, which diverts part or all of the flow of water to an irrigation canal. Beside each weir or spring there is a shrine. The congregation of the weir-shrine or spring shrine consists of all the farmers who use the water originating from this source.The principal deity to receive offerings at the weir-shrine is called the "Deity of the Weir" (*bhatara empelan*). Offerings are also made at these weir-shrines to the Goddess of the Temple of the Crater Lake, who is said to make the rivers flow.

The irrigation canal which takes off from the weir eventually reaches a block of terraces. This spot is usually a kilometer or more downstream from the weir, and is marked by a major water temple, the "Head of the Rice Terraces" temple (*Pura Ulun Swi*). The congregation of this temple is the same as that of the weir shrine: it consists of all farmers who grow rice in the terraces irrigated by this particular canal system. The principal deity of the Ulun Swi temple is called *Ida Bhatara Pura Ulun Swi,* the "Deity of the Ulun Swi Temple", whose influence extends to all of the terraces watered by the canal. The temple itself is simply a walled courtyard containing a shrine where farmers can make offerings to this deity. Additional shrines provide a place for offerings to other gods and goddesses such as the Deity of the Weir and the Goddess of the Crater Lake. These offerings at the Ulun Swi temple acknowledge the dependency of farmers on the flow of waters into their terraces, which in turn depends upon the flow at the weir, and ultimately upon the flow in the river.

More generally, all water temples are physically located at the upstream edge of whatever water system they purport to control. Temples and shrines are situated in such a way as to exert influence over each of the major physical components of the terrace ecosystems, including lakes, springs, rivers, weirs, major canals, blocks of irrigated terraces, subaks and individual fields. The temples link these physical features of the landscape to social units according to a logic of production: the congregation of each temple consists of the farmers who obtain water from the irrigation component "controlled" by the temple's god. Within the

landscape defined by the temples of Catur Angga Batukaru, the major features may be summarized thus:

- The Catur Angga Batukaru site is defined by a collection of temples, each with its own special history and functions, which are associated with the mountain peaks, lakes, forests, springs, rivers and terraces of the region.
- The lake temples in this region are supported by all of the subaks of Tabanan and Mengwi, as well as members of the royal families of the former kingdoms, and play a key role in the annual irrigation schedule for the whole of western Bali. Within the Batukaru Catur Angga region, Lake Tamblingan is the water-source temple for Tabanan. It is also regarded as the female (*pradhana*) complement to the male (*purusa*) mountain.
- In addition to the lake and mountain-peak temples, another cluster of major temples jointly define the "Catur Angga Batukaru" region that is proposed as the core of this World Heritage site. These four guardian temples function as water-source temples (*ulun swi* and/or *bedugul*) for local clusters of subaks, all of which are located at the highest elevation where rice is grown. Each of these temples also possess unique shrines and symbolic attributes which define the meaning of local landscape features. Collectively they define the cosmological meaning of a spatial mandala (supreme or *utama* mandala Catur Angga), which gives the inhabitants of this region specific responsibilities as guardians of the peaks and mountain lakes. Today, descendants of the royal court of Tabanan continue to assist the subaks and villages in the performance of rituals at these temples. Each of the four Catur Angga temples defines a component of the Batu Karu deity: breath at Besikalung; health and strength at Tamba Waras; prosperity at Muncaksari, and the connections that bind all these qualities at Petali.

Having described the symbolic meaning of the Catur Angga Batukaru site for the Balinese, we turn now to a description of agricultural activities by the farmers and subaks in the region. For the majority of families in the Catur Angga Batukaru site, farming continues to be their primary occupation, though landholdings tend to be small (~.2 ha). The people of this region are very cognizant of a religious duty to preserve their sacred landscape and to make good use of its pure water and fertile land. For this reason, they have largely resisted inducements to give

up traditional farming of native Balinese rice. Elsewhere in Bali, there is a documented transition to off-farm employment and rapid land conversion that threaten to undermine the modern subak (Artha Wiguna et al. 2005). But in the Batukaru region, the pre-eminence of rice farming livelihoods and emphasis on values of trust, cooperation, and mutual help (Sutawan 2000) both strengthen and are indicative of the integrity of the subak institution in the area. A 2006 survey on subak governance affirms this observation. The survey asked a sample of 51 farmers in the Batukaru subaks about changes they had observed in the subak during their lifetime. All farmers indicated that the subak continues to be effective in managing water resources and maintaining the contoured rice terraces that typify the landscape; nearly all (49 of 51) agreed that participation among members and willingness to cooperate is as strong now as it was when their parents were farming their land. Looking to the future, three-quarters of the farmers interviewed stated their belief that the subak will continue to be a strong institution, due to the integrity of subak rules (*awig-awig)* and the importance of traditional farming as the appropriate livelihood in this landscape (Fox, personal communication). The interconnectedness of the subak with rituals and temple offerings reinforce this institutional integrity; because the temples that define the sacred landscape require annual offerings from the subaks.

The Batukaru site is also an important centre for the restoration of organic rice farming in Bali, which will be supported by the World Heritage program. In 2005, four farmers from the Subak Wangaya Betan subak of Batukaru and a research team from the Bureau of Agricultural Research and Technology Assessment of Bali's Department of Agriculture began to collaborate to promote sustainable organic farming of native Balinese rice varieties. This intervention was needed because the farmers were resisting pressure to plant non-native rice and use chemical fertilizers and pesticides. This led to the formation of an NGO called *Somya Pertiwi* (Gifts of the Earth Goddess) in the village of Wangaya Betan, where some farmers had recently begun to plant non-native rice. The ongoing activities of *Somya Pertiwi* are both environmental and socioeconomic. First, the group promotes an alternative to intensive chemical-based agriculture based on enhanced modern techniques of organic farming. Local compost production is used to ameliorate the growing problem of agricultural waste products, primarily from chicken and cattle production, and to promote organic rice farming. Second, the project seeks to improve farmers' livelihoods and strengthen subak

institutions. Somya Pertiwi works to *increase* rice yields, growing local rice varieties organically. Compared with conventional "Green Revolution" farming of hybrid white rice varieties that rely on chemical inputs, farmers with Somya Pertiwi can earn greater income from local, organic rice.

Since the project began, rice yields have indeed increased as much as ten percent. Although still quite new, the project has also realized success in the area of environmental conservation. Soil fertility has increased, with the percentage of soil organic matter doubling from less than one percent to two percent. There has also been an increase of biodiversity in the rice fields, evidenced by growing populations of mollusks, eels, worms and beneficial insects (Artha Wiguna et al. 2007). As well, recent analyses of rice samples from the Batukaru area detected no pesticide residues of any kind (Sucofindo, September 15, 2008). This is very unusual for modern Bali, where most farmers today plant high-yielding rice varieties and use chemical inputs (Lansing et al 2007). Today, all 90 farmers of the Subak Wangaya Betan subak grow organic rice. As well, the majority of farmers from neighboring subaks throughout the Batukaru area continue organic rice production, recognizing both the environmental and economic benefits. Somya Pertiwi has established a field training center, where farmers and agricultural extension agents from Bali and throughout Indonesia have begun to come to obtain seeds of native Balinese rice, and learn how to produce organic compost and begin organic rice farming on their own fields. Thus Somya Pertiwi and the training centre provide a model to support scientific organic rice production. This activity will be supported and expanded in the proposed World Heritage Cultural Landscape program, mandated by the Governor of Bali.

Site boundaries and buffer of Catur Angga Batukaru

The boundaries of the site are based on the ancient region "Catur Angga Batukaru" (Four Components of Batukaru), defined by the four ancient water temples and Pura Batukaru. The region is bounded to the north by lakes Tamblingan and Buyan and surrounding forests.

View of Lake Buyan

The lakes and forests are already managed as conservation areas by the Dept of Forestry. To the east the region is bounded by the Yeh Ho river, except for a region consisting of a cluster of subaks located to the east of the river, which belong to the congregation of the temple and are part of the traditional sacred landscape of Catur Angga. The southern boundary is defined by the downstream limits of the subaks that form the congregation of the Catur Angga temple system. Within this region, the nominated area consists of everything within the site, including temples, lakes, forests, villages, subaks, rice terraces and gardens. The entire site is surrounded by a protective buffer zone with a radius of 100 meters, in accordance with provincial and national law (see Chapter 5).

D. Royal Water Temple Taman Ayun

The fourth site proposed for this nomination is the Pura Taman Ayun (Royal Water Temple) in western Bali.

Shrine to the Deity of Lake Beratan in the temple Pura Taman Ayun. Here over a period of three days each year, after the “Water-Opening” ceremonies at Lake Beratan, holy water from the lake temple receives additional blessings from the gods of the temple, and is then distributed to twenty subaks of the former kingdom of Mengwi.

The head of the Subak Batan Badung stands beside the altar where his subak gives thanks for the waters from the moat of the temple Pura Taman Ayun, which irrigated their fields. The moat is visible in the background.

The Pakerisan and Catur Angga Batukaru sites described above are located at high elevation, and date from the time of the formation of the subak system. Later on, as rice cultivation spread and new kingdoms appeared, more complex relationships developed linking the subaks and water temples to Balinese kings. The largest and most architecturally distinguished example of this relationship is the great temple of Taman Ayun (Pura Taman Ayun), located in the heart of Mengwi, the largest Balinese kingdom of the nineteenth century. This site exemplifies the fullest expansion of the subak system, achieved in the eighteenth and nineteenth centuries. **From a technical perspective, the hallmark of this system is the extension of ritualized water control to encompass entire rivers.** Once a year, delegations of subak leaders, water temple priests and princes of the former kingdoms of Mengwi initiate a “Water-Opening” ceremony at the mountain lake of Bratan (adjacent to the Batukaru site). Subsequently, cycles of irrigation and rice cultivation continue at staggered intervals. The subaks are divided into three groups, based on their geographic location. Those located at high elevation plant first, followed by subaks in the central region and then by the subaks furthest downstream, which by virtue of their location are the largest in terms of both water flows and terraced areas. The level of cooperation achieved

by this system is so successful that downstream subaks frequently arrange to "borrow" water from subaks located far upstream. The augmented flow is allowed to pass through the weirs of the intermediary subaks (Geertz 1985, Schulte Nordholt 1996). Thus a parcel of borrowed water may pass undiverted through several weirs before arriving at its downsteam target, thanks to the cooperation of all the intermediate subaks as well as the original donor.

The role of the temple Pura Taman Ayun in this system can be summarized as follows. First, the physical distance and rugged topography separating the large low elevation subaks from the mountain lakes meant that it was difficult for all the subaks to undertake annual pilgrimages to the mountain lakes for the "water-opening" rites. A solution emerged in the form of special "visiting" or "way-station" shrines (*penyawangan*) at the Pura Taman Ayun temple where the subaks could make offerings to the lake deities. Thus in any given year, only a small subak delegation needs to make the pilgrimage to the lakes. A prince of the royal family of Mengwi always accompanies this delegation. After offerings are made at the lake temple, holy water is brought to the Pura Taman Ayun temple to the shrine of the deity of the mountain. For three days, prayers are offered to augment the blessings of the mountain gods with those of other fertility gods and the ancestors of the royal family. All twenty subaks of the Mengwi region then obtain the holy water for their fields from the Pura Taman Ayun temple.

A second major feature of the Pura Taman Ayun temple is the role of the rajah in the control of agricultural pests. As noted above, the traditional solution for pest infestations is the imposition of a large coordinated fallow period, which temporarily deprives the pests of their habitat. In the former kingdom of Mengwi, responsibility for the rituals associated with pest control at this scale (nangluk merana) belongs to the king of Mengwi. The leading colonial ethnographer of Bali, V.E. Korn, describes these rites in detail, and today the prince of Mengwi continues to perform this function.[24]

[24] V.E. Korn, Het Adatrecht van Bali. See also Korn's papers on "Pengabenan Tikus" in the Korn Collection at the Royal Institute of Ethnography in Leiden.

Flooded paddy fields, where rice pests are deprived of their habitat

A third feature of the Pura Taman Ayun temple is the relationship with the Subak Batan Badung (62 hectares). This subak owes its existence to the water from the temple's large moat, and shares responsibility for the temple with the Mengwi royal family. The Pura Taman Ayun temple thus functions as the chief water temple for the Subak Batan Badung.

A fourth aspect of the relationship of this temple to the subaks is visible in the shrines to two deities worshipped by the subaks, in addition to the major shrine to the deity of Lake Beratan. These three shrines are dedicated to Ida Batara Tengahing ring Segara, the sea god who is associated with seasonal pestilence at the temple of Peti Tenget, and the deity of the Ulun Swi (head of the ricefields) temple at Jembaran. These three temples- for the Lake Goddess, the Sea God and the Head of the Ricefields- are known as penyawangan or "way-station" shrines, where a distant deity may receive offerings from a local congregation. They provide a way for the farmers to make offerings to these gods without making annual long-distance pilgrimages to their home temples. The subaks also routinely request holy water blessings from the ancestral shrine of the Mengwi royal family, to augment the holy water obtained from these shrines. Representatives of the royal family assist and accompany the subaks in their annual cycle of rituals at these shrines and temples.

Finally, the Pura Taman Ayun temple exemplifies the supportive role of the princes of western Bali in the later physical expansion of the subak system. This will be discussed below, in the next section.

Site boundaries and buffer of Pura Taman Ayun

Like the temple Pura Ulun Danu Batur, this site consists of a single temple. But unlike Batur, it is surrounded by a wide moat. A protective buffer zone extends for 250 meters around the outer perimeter of the temple, based on provincial zoning restrictions which empower local communities to establish a protected buffer zone around major temples.[25] Within this buffer zone, the Tabanan regional government has implemented zoning restrictions based on a master plan adopted in 2002. The plan takes note of the large number of foreign visitors to the temple, and permits commercial activity along the entrance to the temple (located to the south on both sides of Jalan (Street) Gunung Semeru. The plan also permits residential buildings and shops to the east and west of the moat, but restricts the height of new construction. A detailed description of the legal basis and rationale are provided in Chapter 5.

2.b History and Development

2.b.1. Overview of the Subaks of Bali

The oldest direct evidence for rice on Bali is a radiocarbon date of 2660 +/- 100 BP at the site of Sembiran on the north coast. However, this date is from rice husk used as temper in a pottery sherd of probable Indian origin, and thus does not prove that rice was consumed on Bali at that time (Bellwood et al 1992). More useful are the rice phytoliths found in the sediments at the same site, indicating likely cultivation by 1 AD. The earliest of all the dated Balinese royal inscriptions (Sukawana A I, from AD 882) mentions irrigated rice fields (*huma* in Old Balinese), and the third dated inscription (Bebetin A I, from AD 896) mentions irrigation tunnel engineers (*undagi aungan*). The reference to tunnelers is found in a list of professional artisans who worked for pay, suggesting that at this early date there already was enough demand for irrigation system construction to support them as independent specialists, since no evidence

25 See Regulations of Bali Province Number 5 (2005) Section 19, which clarifies zoning for protected sacred sites, based on local awig-awig (customary law).

connects them with elite courts or village administrations (Christie 1992: 16; 2007: 250; Ardika 1994: 9-10; Ardika and Beratha 1996: 23, 27, 49; 1998: 13). Tunnel experts are mentioned again in the AD 1022 inscription of Batuan, which also contains the first of many mentions of the word sawah, the usual term for irrigated rice fields in Old Javanese (Ardika 1994: 9; Ardika and Beratha 1998: 66, 73; Setiawan 1995: 101-102). The same inscription also refers to the water allocation role of an official called the *makaser* of Air Gajah (Ardika and Beratha 1998: 74, Christie 1992: 15, 2007; Sukarto 1986: 59-60).

The first appearance of the term "subak" is as the root of the word *kasuwakan* in the Pandak Bandung inscription of 1071 AD (No. 436; Ardika 1994: 27, Ardika and Beratha 1998: 313; see also Sukarto 1986: 32-33, Setiawan 1995: 104-105), but it is difficult to tease out much information on the productive and religious roles of the institution from the text. The following year (1072 AD), the terms kasuwakan and kasubakan are used interchangeably in the inscription Klungkung C (No. 438, also known as the charter of Er Rara I; Sukarto 1986: 35-36, 51). This inscription discusses a royal order calling for the remeasurement of the rice fields of the kasubakan of Rawas, and lists the irrigated areas that belonged to this subak, which were located in at least 18 communities. As Christie notes, this suggests that subaks were boundary-crossing entities by the 11th century. She also examines the list of nineteen kasuwakans given in the 1181 AD charter of Udanapatya (No. 628, Pengotan C II), pointing out that, in her words "the kasuwakan names are different from the names of the villages referred to in the same charter, so it does appear that their areas of jurisdiction cross-cut those of the villages" (Christie 1992: 15; 2007; Sukarto 1986: 33- 51). She further observes that the dissected nature of the Balinese landscape requires that irrigation systems frequently tap rivers and springs at points that lie within the lands of villages located well upstream from those that benefit from the water. The construction of boundary-crossing channels and tunnels could provide an impetus for the development of irrigation societies that are largely autonomous from other social institutions. In addition to the 1072 and 1181 AD cases just noted, in this context it is also significant that the 1022 Batuan inscription describes an irrigation system that brought water to "Bataran" from "Pujung Ngaji" and "Air Gajah." These three place-names are usually associated, respectively, with the modern village of Batuan where the inscription was found, the neighborhood of Pejengaji 14 km to the north of Batuan in the village of

Tegallalang, and the monumental site of Goa Gajah in Bedulu, 6 km north of Batuan (Setiawan 1995: 111, 133; Ardika and Beratha 1998: 74). If these place-names are correctly interpreted, the distances involved make this an almost certain case of another boundary-crossing irrigation channel.

The terracing of fields following mountain contours allows for the irrigation and flooding of the fields and reduces the risks associated to soil erosion. Soil cores taken in the Sebatu rice terrraces in 1997 showed that the landscape is quite dynamic with some of the terraces being reengineered nearly every decade (Lansing, et al. 2006: 343, 345).

Studies of the functional significance of the subak date from the nineteenth and early twentieth century. The earliest detailed accounts are from Liefrinck (1886-1887), Korn (1923), Wilk (1929), and Grader (1938). Later accounts of scholars who undertook studies of pre-colonial times are from Lansing, Schulte Nordholt, Geertz, as well as archaeological studies carried out by Schoenfelder and others. Geertz's extended studies and several publications on the subak rely mainly on fieldwork undertaken in 1957-58 (except for his book 'Negara'). Others who have looked at post-colonial Balinese subak are Stingl (1969), Birkelbach (1973), Poffenberger and Zurbuchen (1977-78), Foley (1987), Ramseyer (1988), and Lansing. Scholars who studied the subak of the early 1980s and onwards are foremost but not exclusively Lansing, Bundschu, Jha, MacRae, and Lorenzen. Balinese scholars who have intensively studied the subak in the last couple of decades include Pitana, Sutawan, Windia, Suyadna, Arifin and Arthawiguna and many more.

Dutch colonial authorities arrived on Southern Bali in 1908 and built concrete dams in the river and upgrade primary canals in the 1920s and 1930s (Foley 1987: 86; Horst 1996: 39-40; Schulte Nordholt 1996: 285). Before this time, construction material for the weir or dam at the river was either clay, wood (logs of coconut trees) and/or stone. Canals are usually mud-lined with the primaries sometimes cemented. Diversion weirs are made of bamboo, or more recently cemented. The Indonesian Government continued the Dutch rehabilitation work after independence (Arga and Sudana 1994). Even today, traditional engineering methods are still used to construct new irrigation tunnels, terrraces and weirs.

2.b.1. a Supreme Water Temple Pura Ulun Danu Batur

This temple possesses a collection of traditional lontar manuscripts, which include many passages that provide information on its historic role. Many of the most important manuscripts have been transcribed and printed in Latin script.[26] In one manuscript, the borders of the region ("central Bali") containing 45 communities that supported the temple were defined by river boundaries: on the north coast it reaches from today's border between Buleleng and Karangasem to Singaraja, in the southwest and the south to the Yeh Somi river that constitutes today's border between Tabanan and Badung; to the east to Klungkung and the Yeh Unda river (Pratekaning Usana Siwasasana,§ 14b).

The importance of this temple is also well attested in written records from the colonial era. For example, in 1917 a major earthquake destroyed many temples and palaces in Bali. Some months later, a well-known Dutch architect, P.A.J. Moojen, was employed by the Governor General of the Netherlands Indies to undertake the first survey of major temples in the newly-conquered principalities of south Bali. One of the temples that was severely damaged in the earthquake was Pura Ulun Danu Batur. In his first report to the Governor General, Moojen wrote:

> *There are six temples which are superior to the many village temples, which are most sacred to the Balinese and are honored outside the borders of the little kingdoms in which they are situated. Several authors on Bali give various names for these six, and Frederich mentions that in the Oesana Bali itself there are different temples mentioned. However, it is certain that the Temple of Besakih is the most holy, followed by the Temple of Batur, also called Temple of Mount Lebah. Further information given to me by knowledgeable sources also points to this, and I even received a written request to start quickly on the repairs to the Batur temple.*

The letter to which he refers to in this passage, urging the immediate repair of Batur, is preserved among Moojen's papers in the archives of the Royal Institute for Anthropology and Linguistics (KITLV) in Leiden. The letter was written by the Sedahan Agung (royal tax collector) of the kingdom of Klungkung on the 27th of November 1918, addressed to a Balinese court official in Bangli and to the Dutch Controleur of Klungkung. The letter is written in Malay, and reflects the struggle

[26] Budiastra, P. 1975. Rajapurana Pura Ulun Danu Batur, Kintamani, Bangli. vol. 1 (1975), 2 (1979). Denpasar: Museum Bali.

of the Sedahan Agung to convey the importance of Pura Ulun Danu Batur to a foreign official. The key passage is as follows:

> *…I hope that you will advise the (Dutch) Regent in Bangli, so that he will assist with the temple at Batur at the Ulun Danu, the home of the Deity called the Goddess of the Lake who has the power of control over water, the male has power over fire, this is very important according to Balinese religious custom, because the Deities of Mount Batur and Mount Agung are the children of the Deity of Mahameru who were given power over Bali… therefore it is extremely important that the two aspects of this, Mount Batur and Mount Agung, receive worship, as your servant advised earlier in Badung, and because it is easy to make things right at Batur if the people at Batur are assisted by their father.*

Architect Moojen wrote enthusiastically that

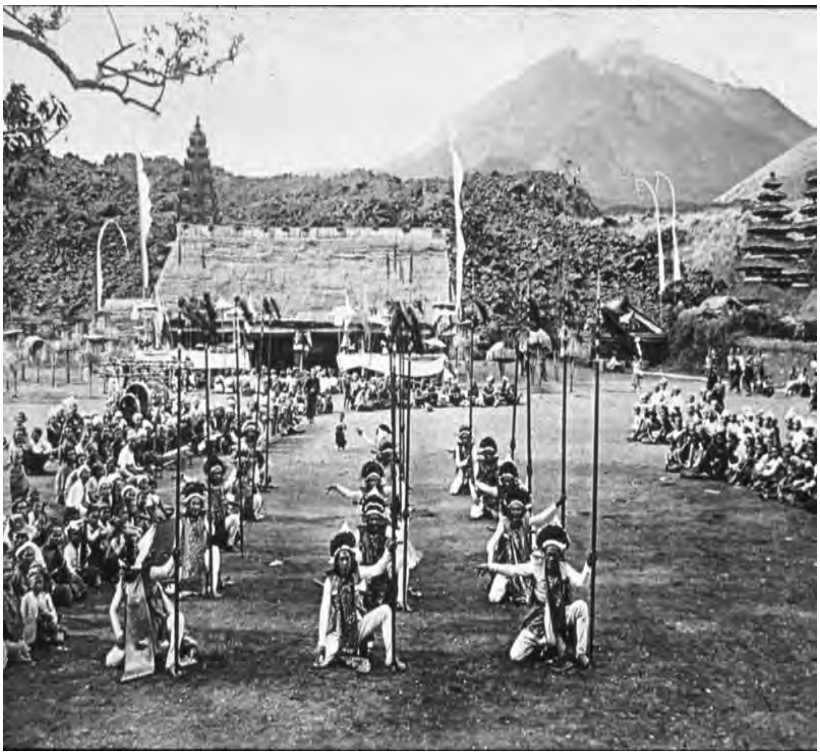
> *The fame of holiness, coming from this temple, has risen after the last eruption of Batoer in 1905 even more by the miraculous way by which it was then saved from total destruction. The glowing lava stream was stopped just at the main entrance in an inexplicable way![1]*

This description is confirmed by the sketches of Nieuwenhuis, who visited the Temple shortly after the eruption. Moojen estimated the cost of restoration of the Batur temple at fl. 30,000, a large sum in 1918. This included a sizeable budget for labor. Batur was the only temple for which Moojen requested funding for labor, for a very interesting reason. As he explained in his report,

> *"wages for labor are not budgeted (for other temples) since among the people it is the custom and tradition to supply this. But for one budget I have made an exception and that is for the temple of Batoer...(Like Besakih), Batoer is of importance to the population of the whole of Bali, and from almost all parts of the island smaller or larger shrines have been built there, or the people have paid a share in their construction.* [1]

Thus according to Moojen's report, the importance of the Batur temple transcended the boundaries of the former kingdoms. Unlike other temples, support for Batur came not only from nearby villages, but from the whole island. These reports indicate that in the immediate precolonial era the temple of Batur functioned as the supreme water temple, much as it does today.

View of the village of Batur circa 1920 when it was located on the floor of the caldera. The meru shrine with stacked pyramidal roofs, dedicated to the Goddess of the Lake, is visible on the left. From the archives of the Koninklijk Institut voor Taal, Land en Volkenkunde, Leiden.



Baris dancers in front of the temple Pura Ulun Danu Batur, circa 1920. The 1916 lava flow that stopped just in front of the temple's main gate is visible in the background. From the archives of the Koninklijk Institut voor Taal, Land en Volkenkunde, Leiden.

At the time of Moojen's report (1918), the Batur temple was located in the village of Batur, in the bowl of the volcano near the lake. In 1926 another volcanic eruption led to the abandonment of this site, and the relocation of the temple and the village to the rim of the crater, overlooking the caldera and lake. These events are thoroughly documented in an administrative report by the senior Dutch official then resident in Bangli:[1]

> *...The village of Batur was situated before August 1926 at the foot of the volcano Batur. It was a neat, well kept village, which could be seen clearly from the crater...*
>
> *On the third of August 1926, at 1 a.m., Mount Batur began to erupt. Along the north-western slope a long crevice appeared with a lot of noise and thunder, from which fires and many lava fountains spewed forth. I was informed of this and went to Kintamani, and descended to the village of Batur. It was impossible to get an overview of the situation: the inhabitants were not worried, and trusted in the power and will of the gods, and in the temple which already once before had stopped the lava- stream. From above you could see that the lava-stream was not moving towards the village. However, it seemed to me that the continuous eruptions would eventually fill the hollow in which the village was nestled. In the afternoon of the first day a new source of lava came into being at about 1200 meters distance from the village. With the sound of a diesel engine, it regularly emitted large waves of blood-red glowing lava. A lava stream started to move towards the village...*[1]

This report goes on to describe the abandonment of the village and the Temple, which were buried under a great tide of lava. The people of Batur had time to gather their possessions, including the orchestras and ceremonial objects stored in the temple, and climbed to the crater rim where they were invited to take refuge in the nearby village of Bayung Gde, where they remained as guests for three years. Soon after their arrival they began to solicit land and financial support from the colonial government in order to rebuild the temple and the village on the crater rim. This triggered another assessment of the importance of the temple by the colonial administration. A 1927 report by Controleur Haar describes the mobilization of funds and labor for the reconstruction of the Temple from the whole population of Bali:

> *At this moment the members of the new village of Batoer are busy preparing the terrain for a new temple. A request to have the whole of Bali participate in this new construction by means of handing over contributions was already made, but will later be prepared more closely by the Anak Agoeng (ruler) of Bangli and proposed again. It was thought to request a contribution of 5 cents per family head. If*

> *you count the number of people at around 1 million (in 1920 the census says that most families consist of 5 people), then approximately 200,000 people would bring in an amount of 10,000 guilders.*[27]
>
> *With this support, a new temple was constructed at its present site, in the village of South Batur on the crater rim. The congregation of subaks that support the temple has grown in recent years, and now numbers more than 250.*

Moojen's interest in the Batur Temple was primarily architectural, and he wrote very little about its cosmological role. But the importance of the Batur Temple to the subaks is confirmed by other reports. For example, the final report (memorie van overgave) of G.A.W.Ch. de Haze Winkelman, Resident of Bali and Lombok, dated April 1937, contains the following remarks:

> *In several areas the custom exists that the inhabitants of a watershed by sending deputations participate in the worship in the sanctuaries dedicated to the goddesses of the mountain lakes (Batoer, Bratan, Boejan and Tamblingan). Holy water is obtained during temple feasts by the representatives of the subaks. The subak members meet the delegations and ceremoniously share out the holy water, and the subak members then sprinkle their fields with it. In this way, they can participate in the blessing which the Goddess of the lake- as keeper of the irrigation waters- shares out to the farmers.*
>
> *Let it also be mentioned that the festival calendar of the subak has no (or at the most only an incidental) relation with the organization of the religious ceremonies which are in the charge of the village community.*[28]

Thus this colonial official acknowledges "the lake goddess as the keeper of irrigation waters", as well as the distinctive calendar of the subaks, the pilgrimages to the lakes to obtain holy water to sprinkle on their fields, the temple festivals, and the Goddess not merely as mistress of lakes or holy water, but irrigation water *(bevloeiingswater)* itself. There are similar references in other documents of the colonial era. For example, V.E. Korn observed that :

> *From several village regulations from Karangasem, this opinion appears without doubt, that the water of the central Balinese lakes-Bratan, Batur, Buyung and Tamblingan- is in the hands of the gods, on whose good*

[27] Lansing, J. Stephen, Chapter Five, Priests and Programmers: Technologies of Power in the Engineered Landscape of Bali. Princeton University Press, 1991. Revised 2nd edition 2007.

[28] A.R.A. Den Haag: Memoire van overgave van G.A.W. Ch. de Haze Winkelman, Resident van Bali en Lombok, April 1937.

will it depends if the rivers will receive enough water through underground canals (a widespread belief).[29]

Further details on the history and functions of this temple are published in Budiastra (1975, 1979), Lansing (1991, 2006, 2007), and Reuter (2002).

2.b.1.b Subak Landscape of Pakerisan

There is a story about this site that is a perennial favorite among those who study Bali—a story that has been published numerous times (Stutterheim 1935: 28-29,Bernet Kempers 1991: 157-158, Dalton 1992: 282, Lansing 1983b: 148, Barth 1993:335, Zurbuchen 1987: 42). It is a story about a stone. Today, this stone sits wrapped in white cloth in a small shrine in a temple in the village of Manukaya in the district (*kecamatan*) of Tampaksiring. Some locals have said that it fell from the sky. Every decade or so, on the full moon of the fourth month, it is taken down the hill from its home in Sakenan Temple to a major ceremony at the temple of Pura Tirtha Empul a kilometer away. There the rock joins other meaningful sacred relics and they are ritually washed in the spring-fed pools that are the focal features of the temple.

Upon this rock there is an inscription in Old Balinese, a language no longer remembered. In the 1920s, the Dutch archaeologist Wilhelm Stutterheim deciphered the inscription and reported his findings to the local Balinese, who had no knowledge of its contents. The inscription proved to bear a date equivalent to 962 A.D., and to tell of King Chandrabhayasingha Warmmadewa's construction or improvement of a bathing place at Pura Tirtha Empul, complete with a dam and two pools (Ardika and Beratha 1996: 112- 113; Goris 1954: 197, Stutterheim 1929-30: 68-69). The translation was incomplete because because some parts of the inscription had been worn away, quite likely by the effects of hundreds of years of regular ritual washings carried out on the day of the full moon of the fourth month—*the very day memorialized in the inscription.*

The proposed Pakerisan World Heritage site contains the water temple mentioned in the inscription, and a collection of downstream subaks and temples which continue to receive water from the springs of Tirtha Empul and neighboring water temples. This valley includes the largest and most physically imposing stone temples that exist in Bali, and was undoubtedly one of the cradles of early

[29] V.E. Korn, Het Adatrecht van Bali. (The Hague: G. Naeff, 1932).

Balinese civilization. The Subaks of Pulagan and Kulub often grow native Balinese rice varieties, which is cultivated in the traditional way. Archaeological evidence suggests that they have been in existence for nearly a millenium.

2.b.1.b.1 Pura Pegulingan

The Pura Pegulingan is an ancient temple that has become a place of worship for local families for generations. However, the antiquity of the site was only revealed in 1983, when debris of a large stone stupa was found in the “jeroan” (inner sanctum) of this pura. Intensive research that followed in 1984 succeeded in unearthing the stupa’s foundation. At the base of the stupa was found an octagonal structure with spokes. At the center of this structure is a miniature stupa which then serves as a model for reconstructing the big stupa. One of the important findings was a stone box containing a thin gold sheet and clay tablets inscribed with Buddha mantras. Judging from the style of writing, it is evident that the finding dated back from the ninth or the tenth century, which was the period of the reign of King Udayana and his spouse Gunapryadharmapadmi. Apparently, at the time, Pura Pegulingan served as a Buddhist place of worship. It is not known for certain when the pura became a place where Hindus came to pray. By agreement with the local community, in 1985 the large Pegulingan stupa began to be restored and was completed in 1991.

2.b.1.b.2 Pura Tirtha Empul

The site is clearly mentioned in the stone inscription describe above, dating to 962 A.D., in which a king commands the building or rebuilding of baths and a dam. This stone remains ritually significant at the temple, demonstrating extraordinary cultural continuity. It is kept at the village temple of Pura Puseh in the village of Manukaya. It is dated 884 in the Saka calendar (962 AD), and states that King Chandrabhaya Singhawarmadewa ordered that the pethirtaan Tirtha Empul be restored. The inscription is the oldest written record about Pura Tirtha Empul which in the inscription was mentioned as “...tirtha di Mpul...” (the holy water at Mpul). The inscription is discussed by W.F. Stutterheim in his book: “Oudheden van Bali” (1929) and by R. Goris (1954) and L.C. Damais (1957).

In 1972, part of Pura Tirtha Empul was damaged by a strong earthquake in Bali. Restoration was made by the community, but no detailed record was available to tell this. Since 1983, the Office for Heritage Conservation in Bali and Lesser Sunda (based in Gianyar, Bali) assisted in the restoration of some damaged parts of the pura and the restoration was completed in 1990.

Pura Tirtha Empul also has an important place in current myths. When asked about the origin of Pura Tirtha Empul, locals usually refer to variants of the Usana Bali legend. By doing so, they in effect attribute the site to a king of gods rather than to a godly king. The story in question concerns a war between the god Indra and the demonic king Mayadenawa. As usually reported, at one point Mayadenawa creates a poison spring, and Indra's army is killed upon drinking its waters. Indra then plunges a kris (sword) or a banner into the earth to create a new spring of holy water (Tirtha Empul) and uses this water to revive his followers. The version of the myth current in Manukaya elaborates on this incident to emphasize the power of Tirtha Empul by telling us that Indra only created the spring after his own priest (analogous to the padandas discussed below) failed to create holy water with the desired effect.

2.b.1.b.3 Pura Mengening

The history and the development of Pura Mengening are difficult to trace due to a lack of historical sources that mention this pura. It is included in the site nomination because of its continuing importance as a water temple. From the architecture of the main temple, one can estimate that this building was erected in the 11th century during the reign of King Anak Wungcu. Through the beginning of the twentieth century, no records exist describing the condition of the temple (prasada) and the Pura Mengening.

Based on oral history from the local community, when Bali was shaken by a huge earthquake in 1917, some buildings in this pura collapsed. The collapse of the temple at Pura Mengening was mentioned by W.F. Stutterheim in 1925. The story of the collapse was reiterated by A.J. Bernet-Kempers in his book: "Ancient Bali" (1960). In this book, only the remains of a temple and some statues were found on a hill near Pakerisan.

In 1982 research began on the temple by the Office for Heritage Conservation in Bali and Lesser Sunda. Based on the results of the research, the temple was

reconstructed and completed in 1983. At present, this temple has become the main building of the pura and is called Prasundan Agung. The garden surrounding the pura was planted in 1985 and the following year “zoning” was designed to protect in the site. In 1986, a more specific mapping of the site was completed. Up to the present, Pura Mengening is used and maintained by the community of Saraseda.

2.b.1.b.4 Pura Gunung Kawi

The history of the establishment of the Pura Gunung Kawi (Rock Cut Temple) is known from several ancient inscriptions found on the walls. A short inscription stated that: “... haji lumah ing jalu...rwa anak ira” meaning “....the King who passed away in the Jalu...and his two children”. The word “Jalu” means “Keris” (Kris=dagger) which leads to the name “Sungai Pakerisan” (River of the Dagger). The king referred to in the inscription (inscription) is King Udayana who reigned in Bali from 989 to 1021. The two sons are King Marakata (1022-1026 M) and (King) Raja Anak Wungsu (1050-1078 M). In one of the inscription published by King Marakata, Pura Gunung Kawi is mentioned as a sacred Amawawati structure found along the Pakerisan River (“... mangswaya ri sanghyang katyagan ing pakrisan mangaran ring amarawati”). Based on the data, it is presumed that the Pura Gunung Kawi (rock cut temple) was built in the 11th century. Some scholars attribute the founding of the site to Udayana in the early 11th century; others to Anak Wungsu in the latter half of the same century, based on a paleographic match to a dated inscription on a statue at Gunung Penulisan,

There is no record of how the development of the Pura Gunung Kawi proceeded after it was constructed. Although the local community was aware of the existence of these candi (temples), it was only in 1920 that its existence became widely known after Resident H.T. Damste reported on their cultural heritage. In the beginning, only temples A, B, and C were known. When Nieuwenkamp visited the site a few years later, he reported that the curved niches on the east side of the rock cut, which were later known as Temple Sepuluh, were still crowned by foliage growth. In 1949, J.C. Krijjamen succeeded in restoring some rock cut niches. He also discovered some other rock cut temples around the area of Pura Gunung Kawi.

Since the findings were made public, the complex of the Pura Gunung Kawi has become an object of tourism. The complex is often visited by foreign as well as local tourists. The local community has set up kiosks to sell souvenirs along the road leading to the temple complex. As noted in the Management Plan, it is anticipated that a participatory approach will improve the profitability and suitability of these commercial establishments in the proposed World Heritage site.

The maintenance of the Pura Gunung Kawi and other temples at the site is sustained by the local community and the office of Archaeological Heritage Conservation in Bali and Lesser Sunda (based in Gianyar). Presently, conservation activities consist mainly of cleaning moss and plants that flourish around the sloping riverbanks. In order to prevent overflow of water during the rainy season, canals on the slope were built, as they were for cluster IV of the temple on the South Western Site. In front of cluster C of the temple, places for worship made of wood were built for visitors. However, ceremonies are held mainly in the temple located in cluster B of the temple premises.

2.b.1.b.5 Subaks Pulagan and Kulub (Upper and Lower)

The water from the springs enclosed by the temple Pura Tirtha Empul now flows into a large canal that delivers it to the rice paddies of Subak Pulagan located in the valley immediately downstream. In the midst of these terraces are found the largest royal tombs and hermitages ever constructed in Bali, which were completed by the 12th century. The flows from two other nearby springs provide water for the subaks Basangambu and Kulub.

The main irrigation canal from the spring at Tirtha Empul,
branching into flows for Pulagan and Kulub Atas

With regard to the antiquity of these subaks, an as-yet uncorroborated radiocarbon date of 635 to 685 (calibrated AD) has been obtained from a test pit located in a rice field close to the canal and about 2 kilometers downstream from the spring, at a level above bilobe rice phytoliths. While the excavator does not have great confidence in this date because it was taken on fine particulate matter that may have been transported up or down the soil column (John Schoenfelder, pers. comm.), it nonetheless hints at the likely antiquity of the system. Thus it appears that Pura Tirtha Empul was one of the oldest and most successful water control projects of Balinese kings.[30] The valley forms a concave microwatershed, utilizing a natural spring with very simple technology: the stone weir described in the tenth century inscription, and a short canal. The history and archaeology of canal irrigation in this region of Bali are discussed in Scarborough et al 1999, 2000; Schoenfelder 2003; Lansing 2006; Lansing et al 2008.

[30] M.M. Soekarto K. Atmodjo, "Some short notes on agricultural data from ancient Balinese inscriptions", in Sartono Kartodirdjo, ed., Papers of the Fourth Indonesian-Dutch History Conference, Yogyakarta 24-29 July 1983), Vol. I: Agrarian History. Yogyakarta: Gadjah Mada University Press, 1986.

Rice terraces of Subak Kumba Bawa

2.b.2 History of the Subak Landscape of Catur Angga Batukaru

As noted above, the earliest documented wet rice kingdoms in Bali originated in the Pakerisan region. Later on, more kingdoms emerged in western Bali, which eventually became Bali's "ricebowl", where the subak system reached its greatest geographic extent. However, most of this development occurred after the end of the Classical era in the fourteenth century. Post-Classical Balinese kings stopped issuing royal edicts (*prasasti*) on copper plates; consequently the early history of these subaks, temples and kingdoms is not as well documented as those of the Classical sites around Pakerisan and Sebatu. However, other kinds of evidence have been used to reconstruct the history of these institutions. Thus molecular genetic evidence sheds light on the population history of the region, and historical records in both Balinese and European languages are available beginning in the eighteenth century for the water temples. Here we briefly summarize the results of these studies.

Neutral genetic markers can be used to reconstruct migration and settlement histories. Lansing et al (2008) analyzed patterns of variation in the non-recombining Y chromosome for 587 Balinese men to gain insight into the history

of subaks in Bali.[31] Genetic samples were obtained from eight subaks located along the Sungi river in west Bali, as well as thirteen subaks located near Pakerisan in the Sebatu region. One hundred random samples were also collected from the administrative districts of Bali, to provide context for the samples from the subaks. The results of genetic analyses on these subaks are fully explored in Lansing et al. (2008). Relevant results may be summarized as follows: the pattern of genetic diversity in all of the genetic systems included in that study are consistent with an historical scenario in which irrigation development began around the springs and rivers located highest upstream, which would have been the easiest sites to develop using traditional technology. Subaks located at the furthest positions upstream on both rivers demonstrate greater levels of genetic differentiation and diversity, indicating that they came into existence before their downstream neighbors. The oldest and most permanent communities are located in the Sebatu region adjacent to Pakerisan. (The antiquity of the Pakerisan subaks is known from prasasti inscriptions, as noted above). Small patrilocal communities with low migration rates, typical of traditional wet-rice farming villages, are subject to high rates of drift on the Y chromosome. If population growth eventually leads to downstream migrations of male kinsmen, the results are genetic patterns like those observed in the Sebatu region, which are technically known to geneticists as a budding deme model.[32]

The second highest levels of NRY STR diversity in the study were found in the two farming villages located furthest upstream along the Sungi river in the region of Batukaru.[33] In the other six subaks located further downstream along the Sungi river, this pattern vanishes and the levels of genetic diversity are indistinguishable

31 Lansing, J. S., Karafet, T. M., Schoenfelder, J. W. and Hammer, M. F. (2008). A DNA signature for the expansion of irrigation in Bali? In *Past Human Migrations in East Asia and Taiwan: Matching Archaeology, Linguistics and Genetics* (eds A. Sanchez-Mazas, R. Blench, M. Ross, I. Peiros and M. Lin). London: Routledge, pp 356-375.

32 Fix, A.G. (2004) 'Kin-structured migration: causes and consequences', *American Journal of Human Biology*, 16: 387–94.

33 Subaks Apit Yeh and P. Akitan, located approximately 1.5 km due east of Batukaru. A third upland subak, Uma Poh, is located immediately downstream from Apit Yeh. This subak is said to have been founded by farmers from Apit Yeh, a conclusion supported by its higher STR diversity.

from the all-Bali sample. Altogether, these results are consistent with several inferences:[34]

- The subaks of Pakerisan and Sebatu are probably among the oldest in Bali, and originated before the 12th century AD.
- Later on, the subak system expanded to the high elevation springs and rivers to the west, downslope from the mountain lakes of Beratan and Tamblingan (i.e. the Batukaru region).
- The subaks located immediately downslope from the volcanic lakes of Tamblingan and Beratan (i.e. the Catur Angga Batukaru region) are likely to be the oldest subaks in western Bali

The oldest reference to the temples of the Catur Angga Batukaru site is contained in the royal copper-plate inscription Babahan 1 dated 947 A.D., issued by the Balinese king Sri Ugrasena (Goris 1929:64-5). This inscription describes the visit of the king to Buwunan and is still preserved in the nearby village temple Pura Puseh Jambelangu of Babahan. It fixes the borders of a temple or asrama Petung Bang Hyang Sidhi, which is believed to be the precursor to the temple Pura Luhur Besikalung. This inscription also refers to local streams and wet-rice agriculture, which supports the genetic evidence that this region was one of the earliest sites in Bali for irrigated rice cultivation.[35] Like the inscription of 962 A.D. at Pura Tirtha Empul described above, this *prasasti* dates the farming community of Babahan (and its responsibility to the temple) to the earliest period of Balinese kingdoms. Subsequently, references to the lake temples are abundant in the later lontar literature of Bali, including major religious texts such as the Purwwa

[34] Lansing, J.S., M. P. Cox, S. S. Downey, M. A. Jannsen, J. W. Schoenfelder. (2009). A robust budding model of Balinese water temple networks. *World Archaeology* 41(1):110-131

[35] The passage which refers to wet-rice (*huma* in Old Javanese) extends privileges to persons in the region of Catuspatha, which may correspond to Catur Angga, who labor in rice fields and those who support religious establishments: “paniungsungyan di catuspatha, anada tu anak dharmmana, tumaku marhuma”. Prasasti Babahan 1, #102:4. Roelof Goris, Prasasti Bali: Inscripties voor Anak Wungcu. (Bandung: N.V. Masa Baru, 1954),page 64.

Cili, Cau (harvest offering) dedicated to goddess Sri, placed in the field during harvest time

Rice granaries; the higher called gelebeg, and the smaller one klumpu. Wongaya-Gede, on the slope of the Watukaru Mountain, Tabanan

Agama. [36] References to the vital role of the major lake temples are also prominent in early European descriptions of Bali and continue in the colonial era, as attested by the reports of de Haze Winkelman and Korn quoted above. An important theme in these descriptions is the unique importance of the subak system in Bali. In 1811 Sir Stamford Raffles visited Bali and was surprised to discover that the Balinese rajahs did not lay claim to all of the productive lands: "the soil is almost invariably considered as the private property of the subject."[37] Similarly in 1887 the Dutch administrator of north Bali carried out a detailed study of land tenure. He concluded that the subak system is the key to the prosperity of Balinese kingdoms: "The explanation for the amazingly high standard of rice cultivation in Bali", he wrote, "is to be found in Montesquieu's observation that 'the yield of the soil depends less on its richness than on the degree of freedom enjoyed by those who till it.'"[38]

Technologically, the small-scale irrigation works of the Batukaru region used only traditional materials until around 1960. Dams were constructed by piling up stones, dikes between rice fields were made of raised soil, and bamboo served

[36] Helen Creese, "Balinese Babad as historical sources: A Reinterpretation of the fall of Gelgel." BKI 147 (1991):236-60.

[37] T.S. Raffles, The History of Java, vol. 2. London: Black, Parbury and Allen, 1817:234.

[38] F.A. Liefrinck, "Rice Cultivation in northern Bali", in J. W. Swellengrebel, ed., Bali: Further Studies in Life, Thought, Ritual. The Hague: [1886-7] 1969:3.

as water pipes. After 1960, the government provided aid in building dams and made water networks more permanent by using cement. Water channels as long as 6 km were built by farmers from the village of Gunungsari to reach the village of Kasembahan. Tunnels as long as 160 m were also constructed in order to enhance the flow of water. In 1975, local farmers built a concrete dam on the River *Yeh Baat*. Thereafter, no new irrigation facilities were built, although some improvements were made. The waterworks in *Gunungsari* were improved by "*gotong royong*" or mutual cooperation in stages from 1977 to 1981, and the dam was repaired in 1980. Otherwise, the terraced rice fields and the *subak* organization in Batukaru have not undergone any significant changes. In 2005, this region was proclaimed a natural and cultural conservation area by the Governor of Bali.

2.c. Historical Notes on the Royal Water Temple Pura Taman Ayun

In the second half of the second millennium C.E., under royal patronage the subak system expanded with the creation of larger dams at downstream locations, where river flows are larger than at the older high elevation sites like Pakerisan and Batukaru. However, the later Balinese kings did not assume direct control of irrigation, or attempt to displace the subaks. Instead, they provided support for both the practical and ritual activities of the subaks. For example, the kingdom of Mengwi came into existence early in the eighteenth century. According to historian H. Schulte Nordholt, at that time Mengwi was largely forested. The first king built a dam in the Sungi river, and subsequently played an important role in irrigation management (Schulte Nordholt 1996: 58). Schulte Nordholt writes that, although 'there is no accurate information' on the villages that existed in Mengwi at the time the dam was built, circa 1750, the picture that emerged from attempts to reconstruct the demography 'is that of a thoroughly fragmented settlement . . . [these villages] would not have been able to clear large tracts of woodlands or to construct irrigation works miles from home' (Schulte Nordholt 1996: 57).

> *In the course of the eighteenth century the sawah area probably expanded under the encouragement of the Mengwi dynasty. But this did not mean that the king centrally controlled the whole. If his control of manpower in the region was limited, his say in the matter of irrigation was no less so. The example of Sibang shows that the larger satellites each managed their own irrigation works and the concomitant taxes*

> *and servitude. The effect of this was that the position of the satellites in relation to the centre was quite strong. The satellites were micro kingdoms (Schulte Nordholt 1996: 61).*

Thus, according to Schulte Nordholt, the mobilization of labor to expand irrigation into previously forested regions of western Bali was accomplished by the lords of these 'micro kingdoms'. Eventually, local water temple clusters merged into the region-wide system of ritualized water control depicted by the annual rites of the temple Pura Taman Ayun.

The creation of large dams by groups of subaks was documented in the early twentieth century by engineers working for the Dutch colonial government. The Dutch completed their conquest of south Bali in 1908, and in 1912 the colonial government began to map the subaks and irrigation systems of south Bali. An irrigation engineer, O.W. Sörensen, described the construction of large storage dams by the subaks in a 1921 engineering report:

> *Because of the deep ravines, dams that hold the water up high are necessary to make irrigation possible. Especially in the district of Gianyar, we find dams of great height (up to 35 meters). In most cases as a result of the irregular terrain the digging of tunnels is necessary, often of respectable length. From there the water follows an open canal to reach the sawahs. The maintenance and repairs of the dams and canals rests with the subak members, who at the charge of the pangloerah, the head of one or more waterschaps [water districts], and under the supervision of the heads of the subaks, the pekasehs, must execute the necessary labor. The same with the construction of new dams: the execution and the costs are borne by those who later will profit from the dam…The best tunnel builders are found in Klungkung and they enjoy a very good reputation all over Bali, so the help of these specialists is always invoked for that kind of work.*
>
> *(Sörensen 1921: 116; translated by J.S. Lansing)*

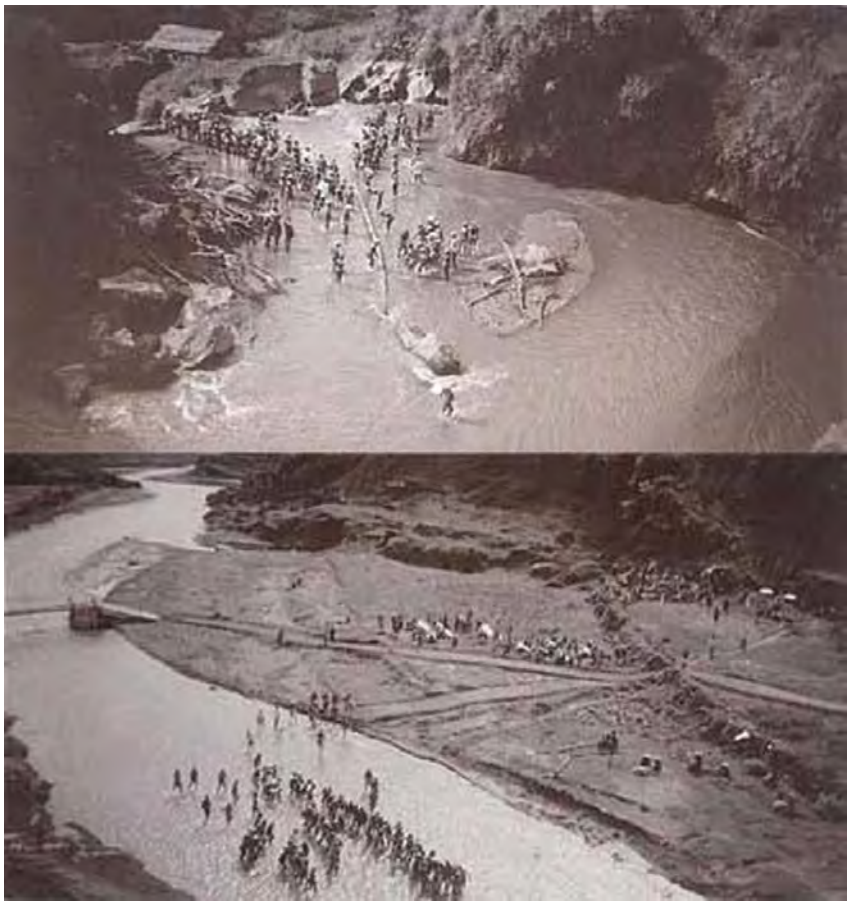
Sörensen provided diagrams, photos and descriptions of some of the large dams constructed by the subaks. Dam construction began in the dry season when flows are low, with the construction of a row of baffles or obstacles in the river where sediment would build up. Larger tunnels were dug on one or both sides of the dam, and the flow diverted so that the dam could be raised and strengthened. These dams were vulnerable to the high flow volumes of the rainy season. Sörensen comments:

> *The normal principle followed by the Balinese in the construction of a prise d'eau is an earthen blocking dam in the river; the dam in general is built up quite a bit above the banjir (flood) height and the top is planted*

> *with coconuts, alang grass etc. To be able to get rid of the banjir (flood) water, on one of the banks a canal is dug that serves as an overflow duct. The dams that are built rather solidly hardly ever suffer from overflow since they are sufficiently high above the height of the banjir; the weak point of the Balinese waterworks lies in the overflow canals.*
>
> *(1921: 116)*

These large dams could retain a large quantity of water to be released in the dry season. A small water temple was placed atop the larger dams. Sörensen provides sketch maps and photos of some of the most impressive dams:

> *The old indigenous dam of Badoeng consisted of a broad approximately 40 meter high earthen dam with two canals for overflow, one on the right and another on the left bank of the river, and a water outlet which delivered water for about 478 bouw sawahs.*
>
> *(1921: 118)*



Photos of the construction of the large dam of Pejeng by local subaks, taken during a visit by the Governor General of Netherlands Indie in 1925.This dam is included within the Pakerisan nominated area. Source: archives of the KITLV.

Thus the temple Pura Taman Ayun reflects the historic expansion of the subak system, in which large multi-subak dams were constructed at lower elevations and the rajahs assisted in subak rites which extended along entire watersheds, from the mountain lakes to the sea. According to the royal chronicle of the kingdom, the Babad Mengwi, the temple Pura Taman Ayun was dedicated in 1634 A.D.[39] In 1890, war between the Kingdoms of Mengwi and Badung compelled the Royal Family of Mengwi to abandon the temple grounds, leaving the area in a state of neglect. Upon the return of the royal family in 1911, the temple grounds were restored and returned to their original function. Subsequently, in 1917, an earthquake caused the collapse of some temple structures. Nearly 40 *adat* villages and the *subak* Batan Badung contributed to the restoration of the temple.

[39] A.J. van der Heijden, "Het Waterschaps Wezen in het voormalige Zuid-Balische Rijks Badoeng en Mengwi", Koloniale Studien 9: 431 (1925). H. Schulte Nordholt, Een Balisches Dynastie, Hierarchie en Conflict in de Negara Mengwi 1700-1940. (Amsterdam: Dissertation in the Vrije Universiteit , 1988). V.E. Korn, Het Adatrecht van Bali, 2nd uitgave. (The Hague: Martinus Nijhoff, 1932).